

**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: September 19, 2002

Federal Communications Commission  
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Telex Communications, Inc.  
Equipment: Telex SAFE-WT  
FCC ID: B5DB115  
FCC Rules: 74H, 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.

Morton Flom, P. Eng.

enclosure(s)  
cc: Applicant  
MF/cva

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

APPLICANT: Telex Communications, Inc.

FCC ID: B5DB115

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 |     |
| _____ COMPLIANCE STATEMENT                            |     |
| _____ 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                   | N/A |
| 6. REQUEST FOR CONFIDENTIALITY                        | X   |

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

---

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: B5DB115

MODEL: Telex SAFE-WT

to

FEDERAL COMMUNICATIONS COMMISSION

Rule Part(s) 74H, Confidentiality

DATE OF REPORT: September 19, 2002

ON THE BEHALF OF THE APPLICANT:

Telex Communications, Inc.

AT THE REQUEST OF:

P.O. 264117

Telex Communications, Inc.  
8601 E. Cornhusker Highway  
P.O. Box 5579  
Lincoln, NE 68505-5579

Attention of:

Charles E. Conner, Project Engineer  
(402) 467-5321; FAX: -3279  
E-mail: charlie.conner@telex.com

SUPERVISED BY:

A handwritten signature in black ink, reading 'M. Flom P. Eng.', is positioned above the printed name 'Morton Flom, P. Eng.'.

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           |
| 2.1033(c)     | General Information Required                       | 2           |
| 2.1033(c)(14) | Rule Summary                                       | 5           |
|               | Standard Test Conditions and Engineering Practices | 6           |
| 2.1046(a)     | Carrier Output Power (Conducted)                   | 7           |
| 2.1046(a)     | ERP Carrier Power (Radiated)                       | 9           |
| 2.1051        | Unwanted Emissions (Transmitter Conducted)         | 10          |
| 2.1053(a)     | Field Strength of Spurious Radiation               | 14          |
| 2.1049(c)(1)  | Emission Masks (Occupied Bandwidth)                | 18          |
| 2.1055(a)(1)  | Frequency Stability (Temperature Variation)        | 24          |
| 2.1055(b)(1)  | Frequency Stability (Voltage Variation)            | 27          |
| 2.202(g)      | Necessary Bandwidth and Emission Bandwidth         | 28          |

PAGE NO.

1 of 28.

*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: d0290046

d) Client: Telex Communications, Inc.  
8601 E. Cornhusker Highway  
P.O. Box 5579  
Lincoln, NE 68505-5579

e) Identification: Telex SAFE-WT  
FCC ID: B5DB115  
EUT Description: Non Broadcast Transmitter

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

g) Report Date: September 19, 2002  
EUT Received: September 16, 2002

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 28.

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

74H, Confidentiality

Sub-part 2.1033

(c)(1): NAME AND ADDRESS OF APPLICANT:Telex Communications, Inc.  
8601 E. Cornhusker Highway  
P.O. Box 5579  
Lincoln, NE 68505-5579MANUFACTURER:

Telex Communications, Inc.

(c)(2): FCC ID: B5DB115MODEL NO: Telex SAFE-WT(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 171K0F1E(c)(5): FREQUENCY RANGE, MHz: 518 to 602  
614 to 746(c)(6): POWER RATING: 10mw to 50 mw  
Switchable Variable x 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: 0.25DUT RESULTS:Passes x Fails

PAGE NO.

3 of 28.

M. Flom Associates, Inc. is accredited by the American Association for Laboratory Accreditation (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 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002.

Presented this 2<sup>nd</sup> day of March, 2001.



President  
For the Accreditation Council  
Certificate Number 1008.01  
Valid to December 31, 2002

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 17025-1999**

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

**ELECTRICAL (EMC)**

Valid to: December 31, 2002 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 C63.4-2000, CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 50081-1; EN 50081-2; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1; CNS 13438 |
| Harmonic Currents                                              | EN 61000-3-2                                                                                                                                                                                                                            |
| Fluctuation and Flicker                                        | EN 61000-3-3                                                                                                                                                                                                                            |
| RF Immunity                                                    | EN: 50082-1, 50082-2, 55024; AS/NZS 4251.1                                                                                                                                                                                              |
| Electrostatic Discharge (ESD)                                  | EN 61000-4-2                                                                                                                                                                                                                            |
| Radiated Susceptibility                                        | EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3                                                                                                                                                                             |
| 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                                                                                                                                                                                        |
| Voltage Dips, Short Interruptions, and Line Voltage Variations | EN 61000-4-11                                                                                                                                                                                                                           |
| 47 CFR (FCC)                                                   | Parts: 2, 18, 21, 22, 23, 24, 25, 26, 27, 74, 80, 87, 90, 95, 97, 101 (excluding SAR Testing)                                                                                                                                           |
| Power Frequency Magnetic Field Immunity                        | EN 61000-4-8                                                                                                                                                                                                                            |
| Immunity to Conducted Disturbances                             | EN 61000-4-6                                                                                                                                                                                                                            |

(A2LA Cert. No. 1008.01) 08/01/02

Page 1 of 1

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644 3248 • Fax: 301-662 2974



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

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

PAGE NO. 4 of 28.

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 = 9

(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.

5 of 28.

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

PAGE NO.

6 of 28.

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. 7 of 28.  
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

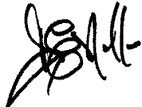
1. The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an R. F. Power Meter.
2. Measurement accuracy is  $\pm 3\%$ .

MEASUREMENT RESULTS  
(worst case)

FREQUENCY OF CARRIER, MHz = 732.5, 722.1, 745.5

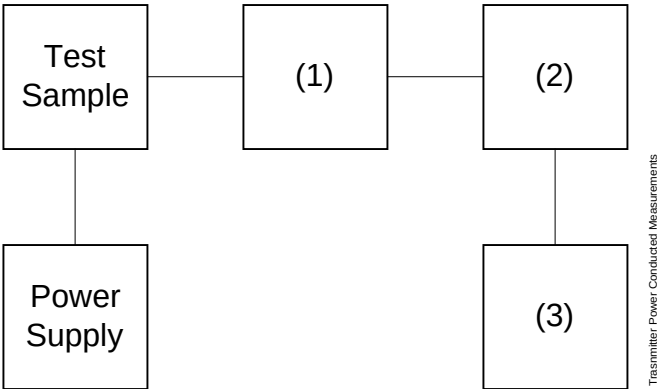
| POWER SETTING | R. F. POWER, MILLIWATTS |
|---------------|-------------------------|
| Low           | 10                      |
| High          | 50                      |

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. 9 of 28.

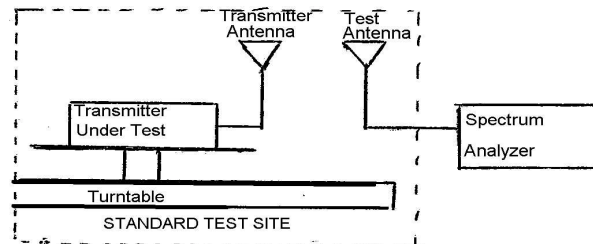
NAME OF TEST: ERP Carrier Power (Radiated)

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:

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

|                     | 518.1 MHz             |                  | RESULTS<br>614.1 MHz  |                  | 745.9 MHz              |                  |
|---------------------|-----------------------|------------------|-----------------------|------------------|------------------------|------------------|
|                     | LVL,<br>dbm           | Path<br>Loss, db | LVL,<br>dbm           | Path<br>Loss, db | LVL,<br>dbm            | Path<br>Loss, db |
| 0°                  | 16.6                  | -0.8             | 15.3                  | -1.2             | 15.7                   | +3.1             |
| 45°                 | 18.9                  | -0.8             | 17.9                  | -1.2             | 17.1                   | +3.1             |
| 90°                 | 16.1                  | -0.8             | 16.9                  | -1.2             | 16.7                   | +3.1             |
| 135°                | 18.2                  | -0.8             | 15.4                  | -1.2             | 17.3                   | +3.1             |
| 180°                | 14.0                  | -0.8             | 18.0                  | -1.2             | 16.5                   | +3.1             |
| 225°                | 19.8                  | -0.8             | 13.4                  | -1.2             | 15.3                   | +3.1             |
| 270°                | 15.3                  | -0.8             | 13.3                  | -1.2             | 15.3                   | +3.1             |
| 315°                | 17.9                  | -0.8             | 15.4                  | -1.2             | 14.8                   | +3.1             |
| Av. Radiated Power: | 518.1 MHz<br>17.9 dbm |                  | 614.1 MHz<br>16.9 dbm |                  | 745.9 MHz<br>12.99 dbm |                  |

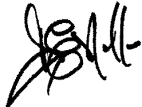
PAGE NO. 10 of 28.  
NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
SPECIFICATION: 47 CFR 2.1051  
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.13  
TEST EQUIPMENT: As per attached page

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

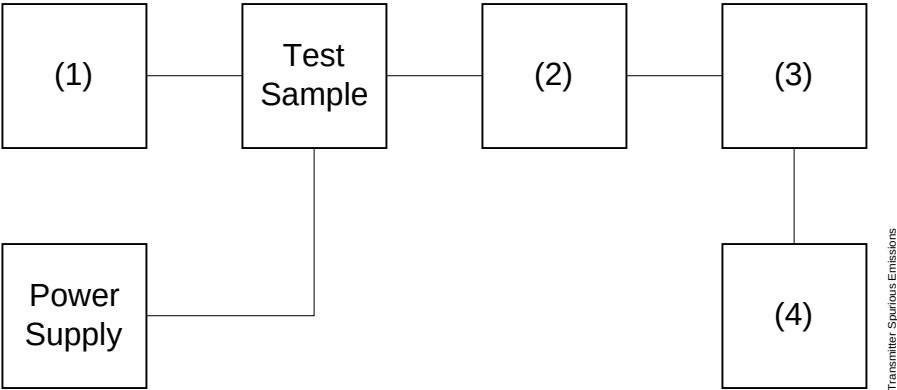
FREQUENCY OF CARRIER, MHz = 732.5, 722.1, 745.5  
SPECTRUM SEARCHED, GHz = 0 to 10 x  $F_c$   
MAXIMUM RESPONSE, Hz = N/A, for digital  
ALL OTHER EMISSIONS =  $\geq 20$  dB BELOW LIMIT

PERFORMED BY:

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

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. 12 of 28.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

LIMIT(S), dBc

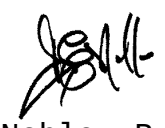
-(43+10xLOG P) = -33 (0.050 Watts)

g0290181: 2002-Sep-16 Mon 12:19:00

STATE: 2:High Power

| FREQUENCY TUNED,<br>MHz | FREQUENCY<br>EMISSION, MHz | LEVEL, dBm | LEVEL, dBc | MARGIN, dB |
|-------------------------|----------------------------|------------|------------|------------|
| 722.100000              | 1444.281400                | -32.2      | -49.1      | -19.2      |
| 732.500000              | 1464.915100                | -34.2      | -51.1      | -21.2      |
| 722.100000              | 2166.164700                | -58.7      | -75.6      | -45.7      |
| 732.500000              | 2197.362200                | -55.7      | -72.6      | -42.7      |
| 722.100000              | 2888.584300                | -67.8      | -84.7      | -54.8      |
| 732.500000              | 2930.115900                | -67.5      | -84.4      | -54.5      |
| 722.100000              | 3610.290300                | -67.5      | -84.4      | -54.5      |
| 732.500000              | 3662.254800                | -68.4      | -85.3      | -55.4      |
| 722.100000              | 4332.562000                | -68.2      | -85.1      | -55.2      |
| 732.500000              | 4395.206300                | -68.7      | -85.6      | -55.7      |
| 722.100000              | 5054.830300                | -67.4      | -84.3      | -54.4      |
| 732.500000              | 5127.679300                | -66.9      | -83.8      | -53.9      |
| 722.100000              | 5776.721100                | -67.7      | -84.6      | -54.7      |
| 732.500000              | 5859.925600                | -62.1      | -79        | -49.1      |
| 722.100000              | 6498.976400                | -62.3      | -79.2      | -49.3      |
| 732.500000              | 6592.328700                | -60.8      | -77.7      | -47.8      |
| 722.100000              | 7220.808700                | -62.3      | -79.2      | -49.3      |
| 732.500000              | 7325.158300                | -62.5      | -79.4      | -49.5      |
| 722.100000              | 7943.245800                | -62.8      | -79.7      | -49.8      |
| 732.500000              | 8057.514500                | -62.4      | -79.3      | -49.4      |
| 722.100000              | 8665.133100                | -62        | -78.9      | -49        |
| 732.500000              | 8790.043400                | -62.2      | -79.1      | -49.2      |
| 722.100000              | 9387.517200                | -61.3      | -78.2      | -48.3      |
| 732.500000              | 9522.546400                | -61.8      | -78.7      | -48.8      |
| 722.100000              | 10109.625200               | -62.9      | -79.8      | -49.9      |
| 732.500000              | 10254.838200               | -61.7      | -78.6      | -48.7      |
| 722.100000              | 10831.395100               | -61        | -77.9      | -48        |
| 732.500000              | 10987.555400               | -62.2      | -79.1      | -49.2      |

PERFORMED BY:

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

PAGE NO. 13 of 28.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

LIMIT(S), dBc

-(43+10xLOG P) = -33 (0.050 Watts)

STATE: 2:High Power g0290183: 2002-Sep-16 Mon 12:37:00

| FREQUENCY TUNED,<br>MHz | FREQUENCY<br>EMISSION, MHz | LEVEL, dBm | LEVEL, dBc | MARGIN, dB |
|-------------------------|----------------------------|------------|------------|------------|
| 722.100000              | 1444.280900                | -33.3      | -50.2      | -20.3      |
| 732.500000              | 1464.912600                | -36.1      | -53        | -23.1      |
| 745.500000              | 1490.908100                | -39.4      | -56.3      | -26.4      |
| 722.100000              | 2166.162200                | -59.9      | -76.8      | -46.9      |
| 732.500000              | 2197.363700                | -54.8      | -71.7      | -41.8      |
| 745.500000              | 2236.629300                | -61.5      | -78.4      | -48.5      |
| 722.100000              | 2888.272700                | -67.4      | -84.3      | -54.4      |
| 732.500000              | 2929.819700                | -68.1      | -85        | -55.1      |
| 745.500000              | 2981.979000                | -67        | -83.9      | -54        |
| 722.100000              | 3610.329200                | -68.2      | -85.1      | -55.2      |
| 732.500000              | 3662.617400                | -67.1      | -84        | -54.1      |
| 745.500000              | 3727.561400                | -68        | -84.9      | -55        |
| 722.100000              | 4332.571000                | -68.3      | -85.2      | -55.3      |
| 732.500000              | 4394.910100                | -68.4      | -85.3      | -55.4      |
| 745.500000              | 4472.852700                | -67.5      | -84.4      | -54.5      |
| 722.100000              | 5054.522700                | -67.2      | -84.1      | -54.2      |
| 732.500000              | 5127.532000                | -67.8      | -84.7      | -54.8      |
| 745.500000              | 5218.465500                | -68.1      | -85        | -55.1      |
| 722.100000              | 5776.819500                | -67.5      | -84.4      | -54.5      |
| 732.500000              | 5859.811200                | -62.1      | -79        | -49.1      |
| 745.500000              | 5963.767300                | -61.9      | -78.8      | -48.9      |
| 722.100000              | 6499.082800                | -62.6      | -79.5      | -49.6      |
| 732.500000              | 6592.735200                | -62.3      | -79.2      | -49.3      |
| 745.500000              | 6709.734700                | -61.6      | -78.5      | -48.6      |
| 722.100000              | 7221.173300                | -62        | -78.9      | -49        |
| 732.500000              | 7325.122900                | -62.9      | -79.8      | -49.9      |
| 745.500000              | 7454.979500                | -62.1      | -79        | -49.1      |
| 722.100000              | 7943.325200                | -61.5      | -78.4      | -48.5      |
| 732.500000              | 8057.728200                | -61.5      | -78.4      | -48.5      |
| 745.500000              | 8200.705300                | -62.7      | -79.6      | -49.7      |
| 722.100000              | 8665.177500                | -60.7      | -77.6      | -47.7      |
| 732.500000              | 8789.907600                | -62.4      | -79.3      | -49.4      |
| 745.500000              | 8946.208200                | -62        | -78.9      | -49        |
| 722.100000              | 9387.302000                | -62.6      | -79.5      | -49.6      |
| 732.500000              | 9522.482500                | -61.7      | -78.6      | -48.7      |
| 745.500000              | 9691.350700                | -61.9      | -78.8      | -48.9      |
| 722.100000              | 10109.203700               | -62.6      | -79.5      | -49.6      |
| 732.500000              | 10254.832200               | -62.5      | -79.4      | -49.5      |
| 745.500000              | 10436.857200               | -62.2      | -79.1      | -49.2      |
| 722.100000              | 10831.693800               | -61.9      | -78.8      | -48.9      |
| 732.500000              | 10987.572400               | -62.2      | -79.1      | -49.2      |
| 745.500000              | 11182.414100               | -61.5      | -78.4      | -48.5      |

PERFORMED BY:

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

PAGE NO. 14 of 28.

NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

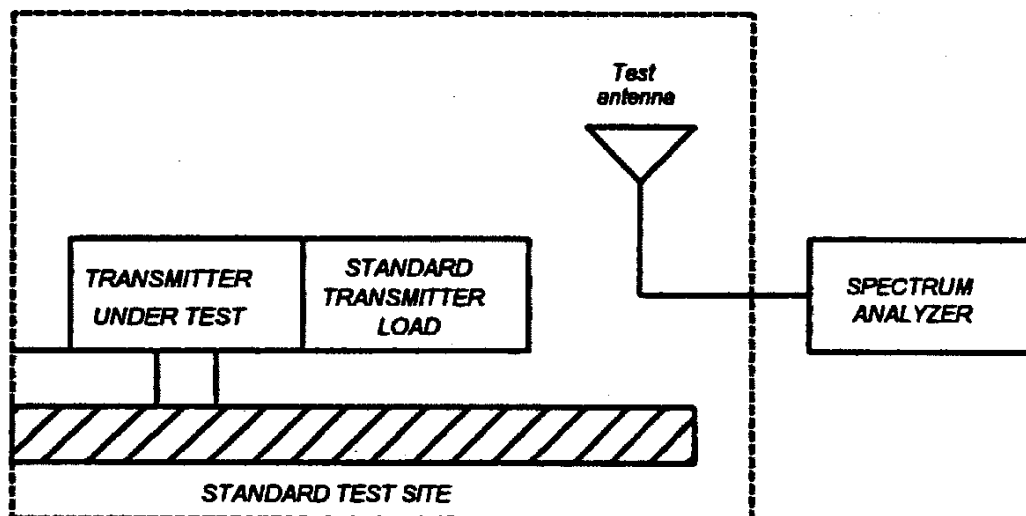
GUIDE: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16, 47 CFR 22.917

#### 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

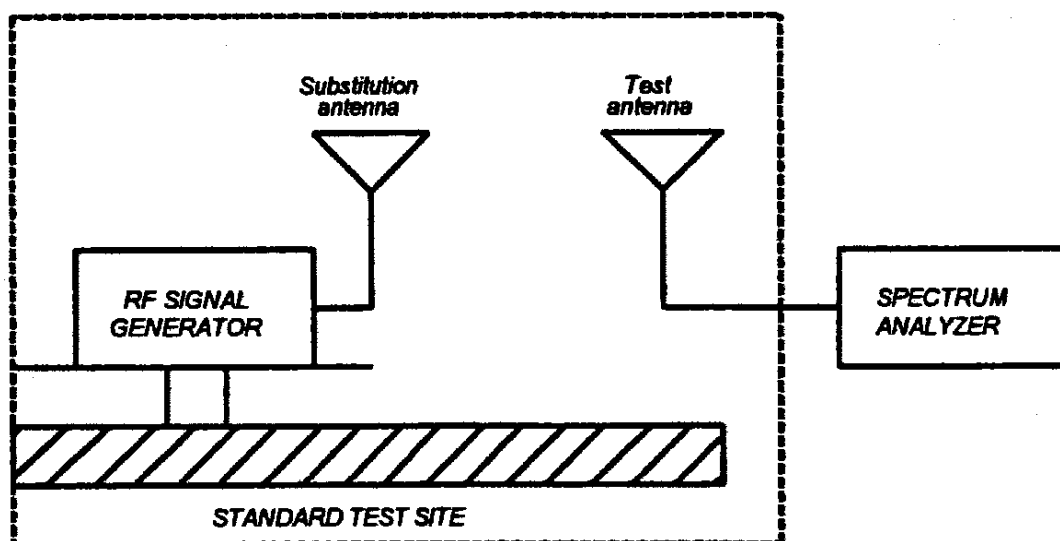
- A) Connect the equipment as illustrated
- B) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth 100 kHz (<1 GHz), 1 MHz (> 1GHz).
  - 2) Video Bandwidth  $\geq 3$  times Resolution Bandwidth, or 30 kHz (22.917)
  - 3) Sweep Speed  $\leq 2000$  Hz/second
  - 4) Detector 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. 15 of 28.

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. 16 of 28.

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:

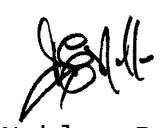
| Asset Description<br>(as applicable)                  | s/n        | Cycle  | Last Cal                                |
|-------------------------------------------------------|------------|--------|-----------------------------------------|
| <small>Per ANSI C63.4-1992/2000 Draft, 10.1.4</small> |            |        |                                         |
| <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.  | Jan-02                                  |
| <b>MICROPHONE, ANTENNA PORT, AND CABELING</b>         |            |        |                                         |
| Microphone                                            | Yes/No     | Y      | Cable Length <u>1.0</u> Meters          |
| Antenna Port Terminated                               | Yes/No     | Y      | Load <u>N</u> Antenna Gain <u>0</u> dBd |
| All Ports Terminated by                               | Load       | Y      | Peripheral <u>N</u>                     |

PAGE NO. 17 of 28.

NAME OF TEST: Field Strength of Spurious Radiation  
 g0290175: 2002-Sep-16 Mon 09:42:00  
 STATE: 2:High Power

| FREQUENCY TUNED,<br>MHz | FREQUENCY<br>EMISSION, MHz | ERP, dBm | ERP, dbc |
|-------------------------|----------------------------|----------|----------|
| 732.500000              | 1464.915833                | -57.1    | ≤ -69.16 |
| 732.500000              | 2197.364167                | -56.6    | ≤ -69.16 |
| 732.500000              | 2929.837500                | -51.6    | ≤ -69.16 |
| 732.500000              | 3662.688333                | -56.5    | ≤ -69.16 |
| 732.500000              | 4395.125000                | -54.7    | ≤ -69.16 |
| 732.500000              | 5127.390833                | -55.7    | ≤ -69.16 |
| 732.500000              | 5860.035833                | -54.9    | ≤ -69.16 |
| 732.500000              | 6592.576667                | -53.8    | ≤ -69.16 |
| 732.500000              | 7324.975000                | -53.2    | ≤ -69.16 |

SUPERVISED BY:

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

PAGE NO. 18 of 28.  
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

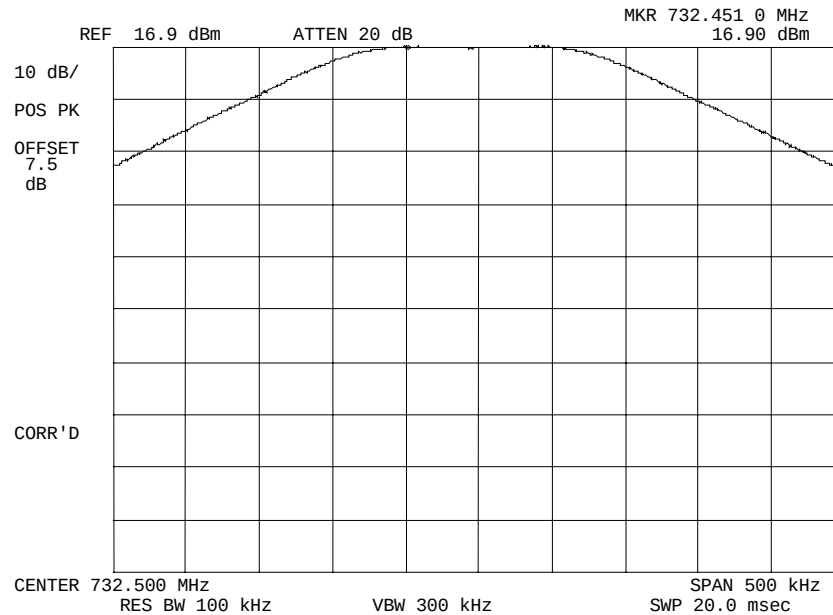
MEASUREMENT PROCEDURE

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.

19 of 28.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0290176: 2002-Sep-16 Mon 12:10:00  
STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
DIGITAL  
REFERENCE LEVEL

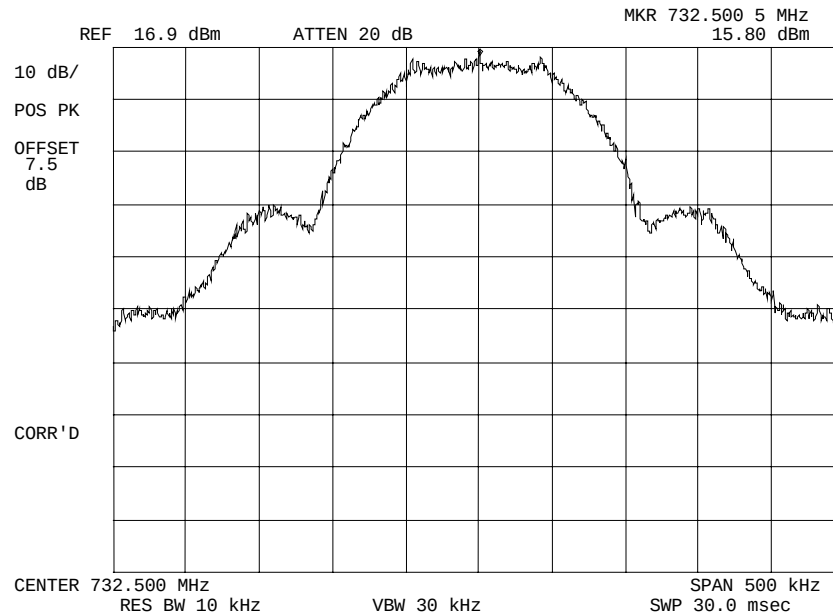
PERFORMED BY:

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

PAGE NO.

20 of 28.

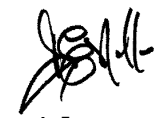
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g0290177: 2002-Sep-16 Mon 12:11:00  
 STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
DIGITAL

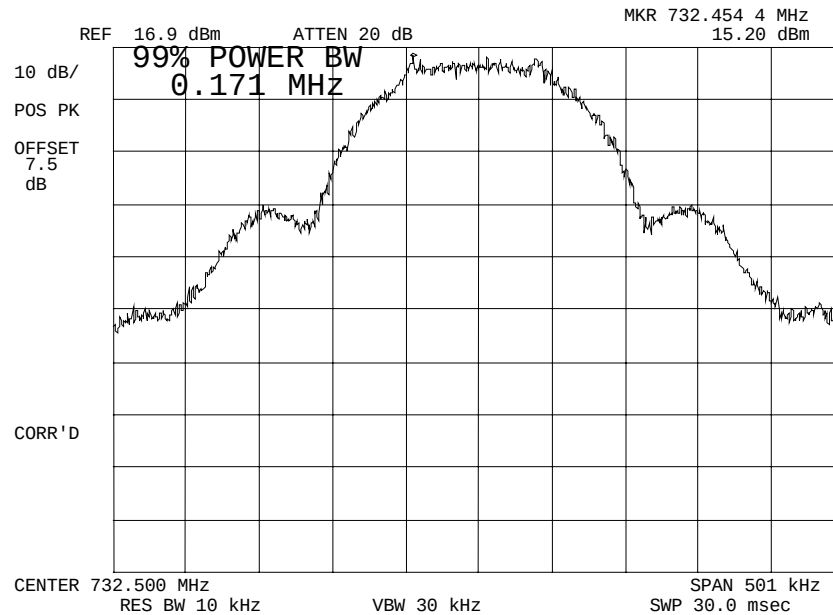
PERFORMED BY:

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

PAGE NO.

21 of 28.

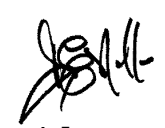
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g0290178: 2002-Sep-16 Mon 12:12:00  
 STATE: 2:High Power



POWER:  
 MODULATION:

HIGH  
 DIGITAL  
 99 % POWER BANDWIDTH

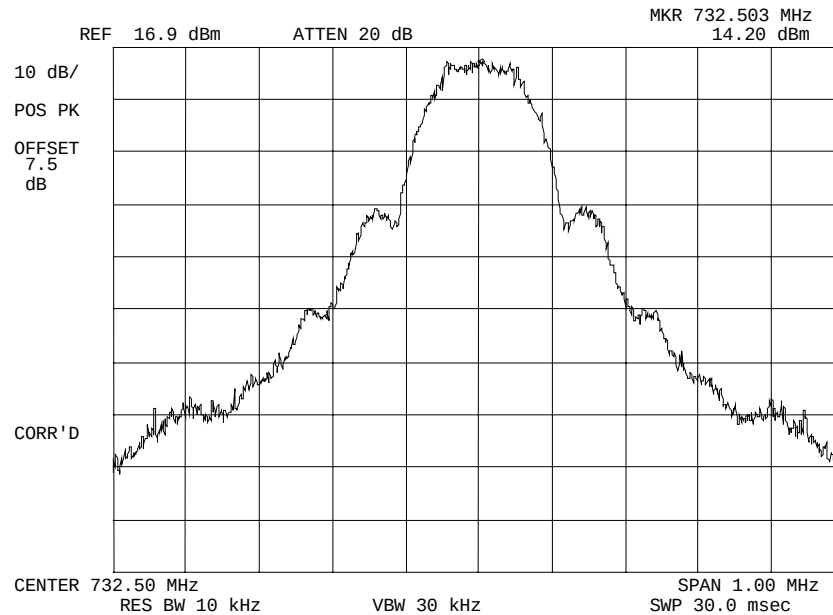
PERFORMED BY:

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

PAGE NO.

22 of 28.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g0290179: 2002-Sep-16 Mon 12:13:00  
STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
DIGITAL

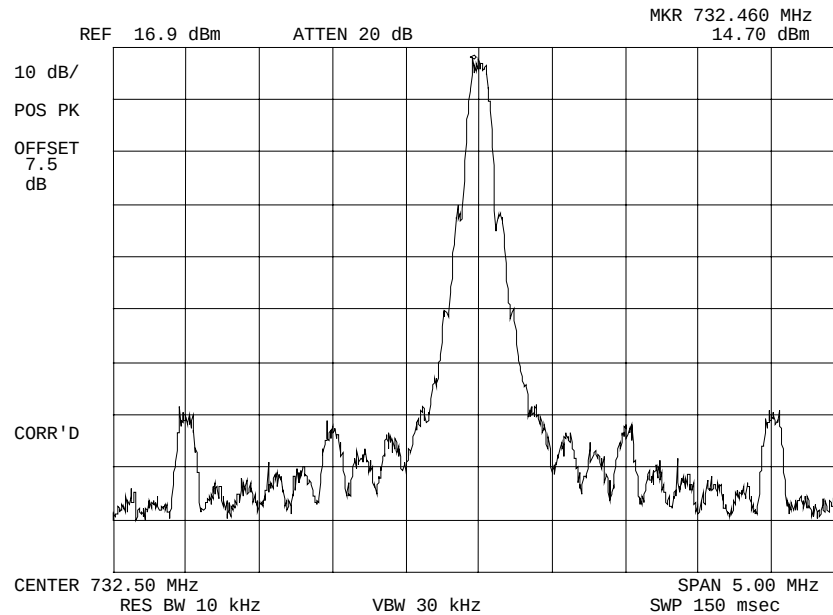
PERFORMED BY:

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

PAGE NO.

23 of 28.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g0290180: 2002-Sep-16 Mon 12:13:00  
 STATE: 2:High Power



POWER:  
 MODULATION:

HIGH  
 DIGITAL

PERFORMED BY:

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

PAGE NO. 24 of 28.

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

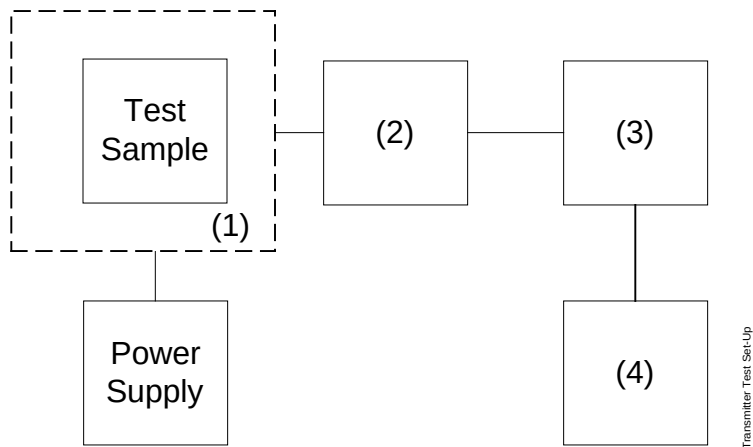
TEST EQUIPMENT: As per previous page

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

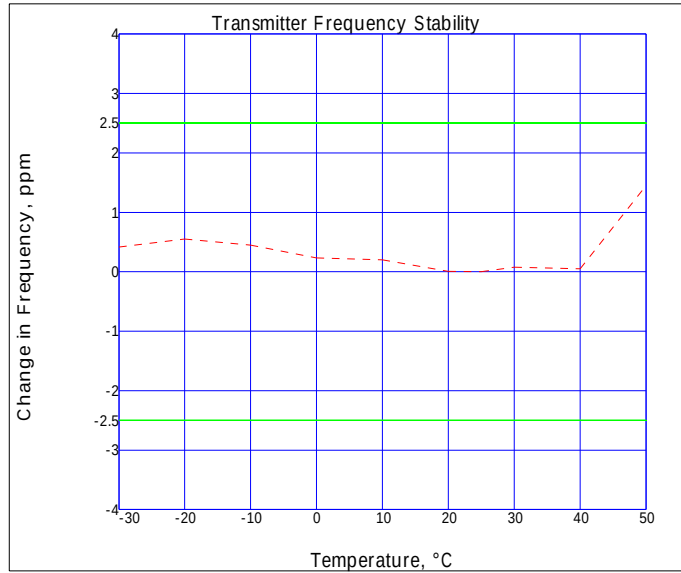


| Asset  | Description<br>(as applicable)          | s/n          |
|--------|-----------------------------------------|--------------|
| (1)    | <u>TEMPERATURE, HUMIDITY, VIBRATION</u> |              |
| i00027 | Tenney Temp. Chamber                    | 9083-765-234 |
| i00    | Weber Humidity Chamber                  |              |
| 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   |

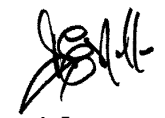
PAGE NO.

26 of 28.

NAME OF TEST: Frequency Stability (Temperature Variation)  
g0290002: 2002-Sep-03 Tue 14:29:47  
STATE: 0:General



PERFORMED BY:

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

PAGE NO. 27 of 28.  
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

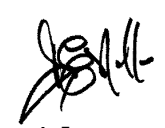
1. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected as for "Frequency Stability - Temperature Variation" test.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency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

RESULTS: Frequency Stability (Voltage Variation)  
 g0290184: 2002-Sep-16 Mon 13:09:31  
 STATE: 0:General

LIMIT, ppm = 50  
 LIMIT, Hz = 36625  
 BATTERY END POINT (Voltage) = 7.2

| % of STV | Voltage | Frequency, MHz | Change, Hz | Change, ppm |
|----------|---------|----------------|------------|-------------|
| 85       | 7.65    | 732.499960     | -40        | -0.05       |
| 100      | 9       | 732.500000     | 0          | 0.00        |
| 115      | 10.35   | 732.500080     | 80         | 0.11        |
| 80       | 7.2     | 732.500180     | 180        | 0.25        |

PERFORMED BY:

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

PAGE NO. 28 of 28.

NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

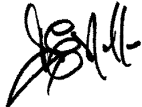
SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 171K0F1E

NECESSARY BANDWIDTH CALCULATION:

|                                    |                |
|------------------------------------|----------------|
| MAXIMUM MODULATION (M), kHz        | = 5            |
| MAXIMUM DEVIATION (D), kHz         | = 80           |
| CONSTANT FACTOR (K)                | = 1            |
| NECESSARY BANDWIDTH ( $B_N$ ), kHz | = 171 measured |
|                                    | =              |

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.