

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

Date: June 6, 2000

Federal Communications Commission
VIA ELECTRONIC FILING

Attention: Authorization & Evaluation Division

Applicant: LightSPEED Technologies, Inc.
Equipment: LES-311TX
FCC ID: ORVLES-311TX
FCC Rules: 95G

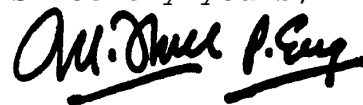
Gentlemen:

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,



Morton Flom, P. Eng.

enclosure(s)
cc: Applicant
MF/cvr

MFA **M. Flom Associates, Inc. - Global Compliance Center**
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C E R T I F I C A T I O N

of

RECEIVER MODEL: LES-311TX

FCC ID: ORVLES-311TX

to

FEDERAL COMMUNICATIONS COMMISSION

Part 95G and Part 2.1031

DATE OF REPORT: June 6, 2000

ON THE BEHALF OF THE APPLICANT:

LightSPEED Technologies, Inc.

AT THE REQUEST OF:

P.O. Norton Yu, 3/17/2000

LightSPEED Technologies, Inc.
15812 S.W. Upper Boones Ferry Rd.
Lake Oswego, OR 97035

Attention of:

Jerry Ramey, President
(800) 732-8999; (503) 684-5538; FAX: -3197
Tom Ogle, Technical Support Manager
E-mail: tomo@lightspeed-tek.com

SUPERVISED BY:



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.

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

- a) TEST REPORT
- b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85225
- c) Report Number: d0060001
- d) Client: LightsPEED Technologies, Inc.
15812 S.W. Upper Boones Ferry Rd.
Lake Oswego, OR 97035
- e) Identification: LES-311TX
Description: FCC ID: ORVLES-311TX
Wireless Microphone Transmitter
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: June 6, 2000
EUT Received: March 10, 2000
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by: 
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 30.

GENERAL INFORMATION REQUIRED FOR CERTIFICATION

Sub-part 2.948:

(a)(b) DESCRIPTION OF MEASUREMENT FACILITIES:
FILE: 31040/511

A description of the measurement facilities was filed with the Commission and was found to be in compliance with the requirements of Section 2.948, by letter dated March 3, 1997. All pertinent changes will be reported to the Commission by up-date prior to March 2000.

(b)(4): SUPPORTING STRUCTURES:

SKETCH - ATTACHED EXHIBITS

(b)(5)(6): TEST INSTRUMENTATION:

LIST - SEE EXHIBITS

2.925: IDENTIFICATION OF AN AUTHORIZED DEVICE:

DRAWING - SEE EXHIBITS

LOCATION OF LABEL - SEE PHOTOS

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

LightSPEED Technologies, Inc.
 15812 S.W. Upper Boones Ferry Rd.
 Lake Oswego, OR 97035

VENDOR:

Applicant

(c)(2): FCC ID: ORVLES-311TX

MODEL NO: LES-311TX

PHOTOGRAPHS:

SEE LIST OF EXHIBITS

PAGE NO. 3 of 30.

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

95G

Sub-part 2.1033(c)(1): NAME AND ADDRESS OF APPLICANT:LightSPEED Technologies, Inc.
15812 S.W. Upper Boones Ferry Rd.
Lake Oswego, OR 97035MANUFACTURER:

Taiwan

(c)(2): FCC ID: ORVLES-311TXMODEL NO: LES-311TX(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 50K0F3E(c)(5): FREQUENCY RANGE, MHz: 216 to 217(c)(6): POWER RATING, Watts: 0.050
Switchable Variable x N/A(c)(7): MAXIMUM POWER RATING, Watts: 0.10095.647: ANTENNA REQUIREMENT:x The antenna is permanently attached to the EUT
 The antenna uses a unique coupling
 The EUT must be professionally installed
 The antenna requirement does not apply

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



THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

M. FLOM ASSOCIATES, INC.
Chandler, AZ

for technical competence in the field of

Electrical (EMC) Testing


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

Presented this 24th day of November, 1998.



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

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



American Association for Laboratory Accreditation

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

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

ELECTRICAL (EMC)

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

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

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

Revised 2/2/2000

Peter Abjorn

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

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

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

PAGE NO.

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Sub-part
2.1033(c)(14):TEST AND MEASUREMENT DATA

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

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

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STANDARD TEST CONDITIONS
and
ENGINEERING PRACTICES

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

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

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

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

PAGE NO. 7 of 30.

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	=	216.532
SPECTRUM SEARCHED, GHz	=	0 to 10 x F _c
MAXIMUM RESPONSE, Hz	=	11700
ALL OTHER EMISSIONS	=	≥ 20 dB BELOW LIMIT
LIMIT(S), dBc		
	- (43+10xLOG P)	= -58.1 (32 Watts)

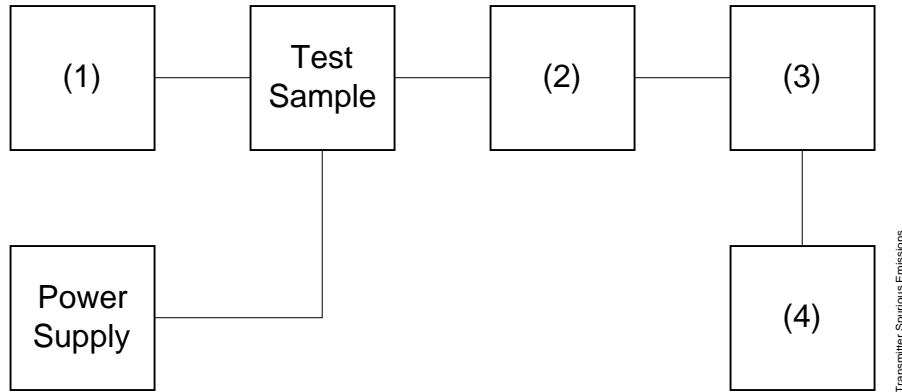
SUPERVISED BY:



Morton Flom, P. Eng.

TRANSMITTER SPURIOUS EMISSION

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



Asset Description (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.

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 g0030240: 2000-Mar-30 Thu 11:52:00
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
216.532000	433.074000	-63.1	-78.8	-50.1
216.532000	649.633000	-50.9	-66.6	-37.9
216.532000	866.132000	-46.5	-62.2	-33.5
216.532000	1082.662000	-51	-66.7	-38
216.532000	1299.199000	-55.6	-71.3	-42.6
216.532000	1515.713000	-59.2	-74.9	-46.2
216.532000	1732.352000	-61.1	-76.8	-48.1
216.532000	1948.631000	-62.8	-78.5	-49.8
216.532000	2165.144000	-62.6	-78.3	-49.6
216.532000	2381.938000	-62.1	-77.8	-49.1
216.532000	2597.886000	-65.2	-80.9	-52.2
216.532000	2814.618000	-64.9	-80.6	-51.9
216.532000	3031.615000	-65.9	-81.6	-52.9
216.532000	3248.059000	-64.5	-80.2	-51.5

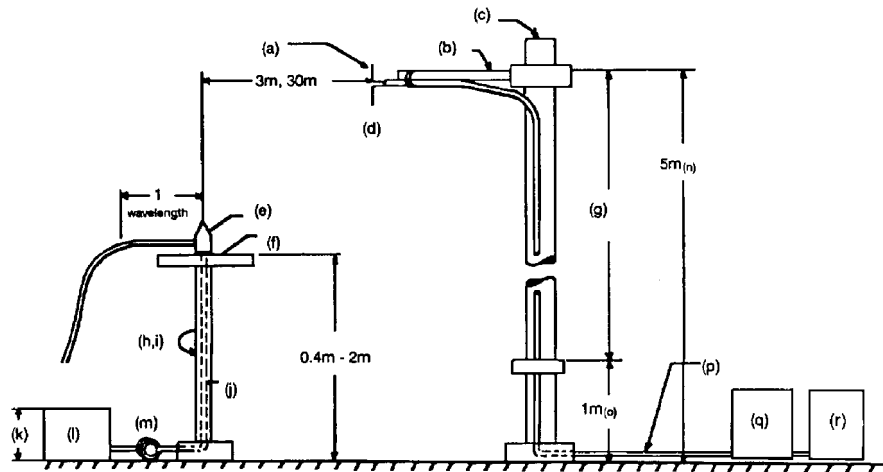
PAGE NO. 10 of 30.
NAME OF TEST: Field Strength of Spurious Radiation
SPECIFICATION: 47 CFR 2.1053(a)
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.12
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 15.38, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2000.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.

The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

RADIATED TEST SETUP



NOTES:

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

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

PAGE NO. 12 of 30.

NAME OF TEST: Field Strength of Spurious Radiation
 g0030229: 2000-Mar-28 Tue 14:27:00
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	ERP, dBm	MARGIN, dB
216.532000	433.068000	31.69	23.79	-41.9	-28.9
216.532000	649.605000	36.04	27.86	-33.5	-20.5
216.532000	866.147700	19.33	30.1	-47.9	-35
216.532000	1082.683100	20.72	32.9	-43.8	-30.8
216.532000	1299.219200	18.05	35.45	-43.9	-30.9
216.532000	1515.757410	3.1	37.65	-56.6	-43.7
216.532000	1732.294230	-0.45	39.64	-58.2	-45.2
216.532000	1948.830770	-9.49	41.64	-65.2	-52.3
216.532000	2165.362390	-26.28	43.43	-80.2	-67.3

PAGE NO. 13 of 30.
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 attached page

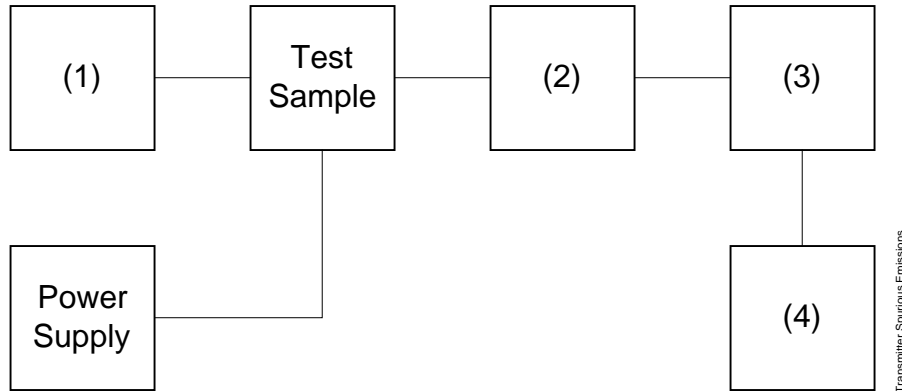
MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected.
2. For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for ± 2.5 kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.
3. For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.
4. The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.
5. MEASUREMENT RESULTS: ATTACHED

PAGE NO.

TRANSMITTER SPURIOUS EMISSION

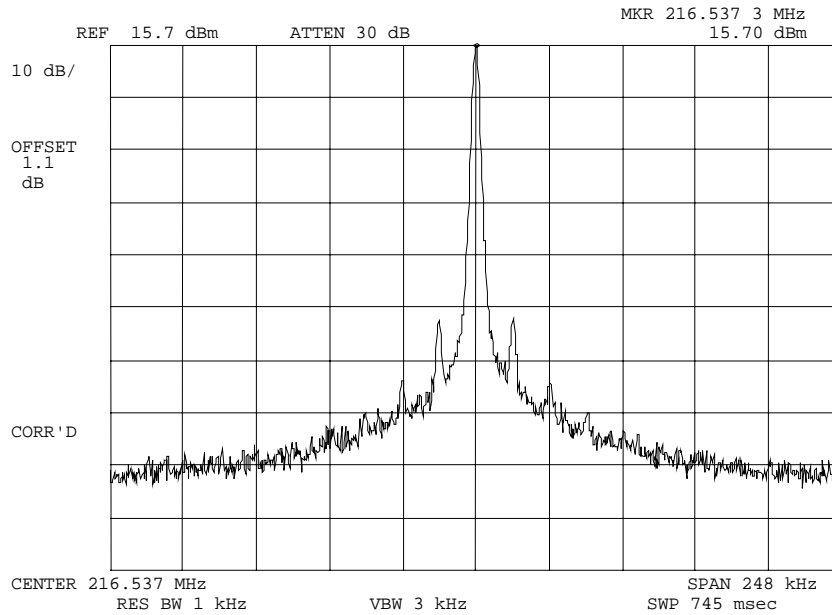
TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)
 TEST B. OUT-OF-BAND SPURIOUS



Asset Description (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. 15 of 30.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0030230: 2000-Mar-29 Wed 15:22:00
STATE: 2:High Power



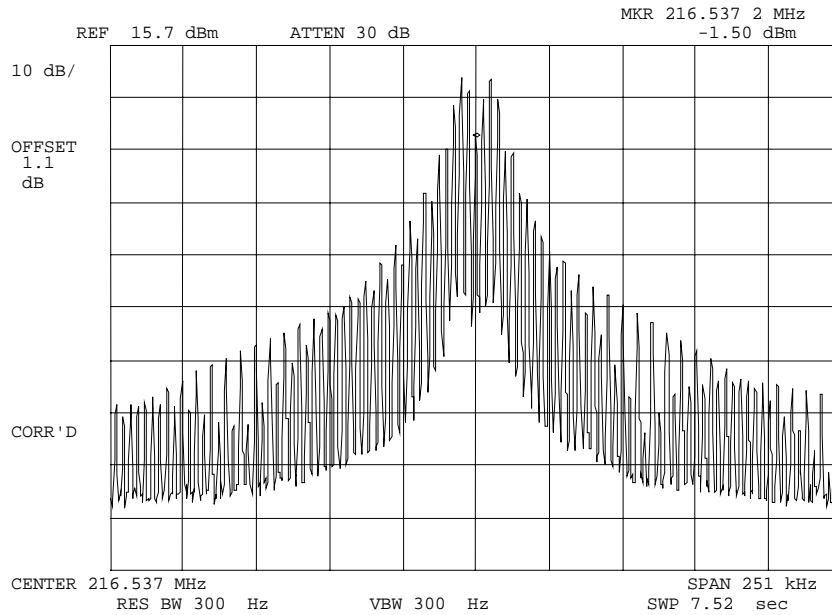
POWER: HIGH
MODULATION: NONE

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 16 of 30.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0030232: 2000-Mar-29 Wed 16:02:00
STATE: 2:High Power



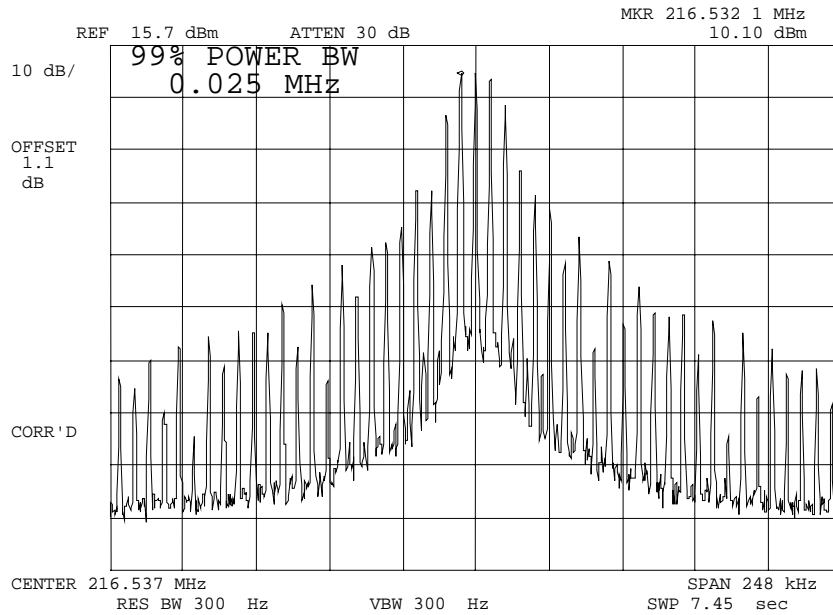
POWER: HIGH
MODULATION: 2500 HZ @ 20DB ABOVE REFERENCE LEVEL

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 17 of 30.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0030239: 2000-Mar-30 Thu 11:29:00
STATE: 2:High Power



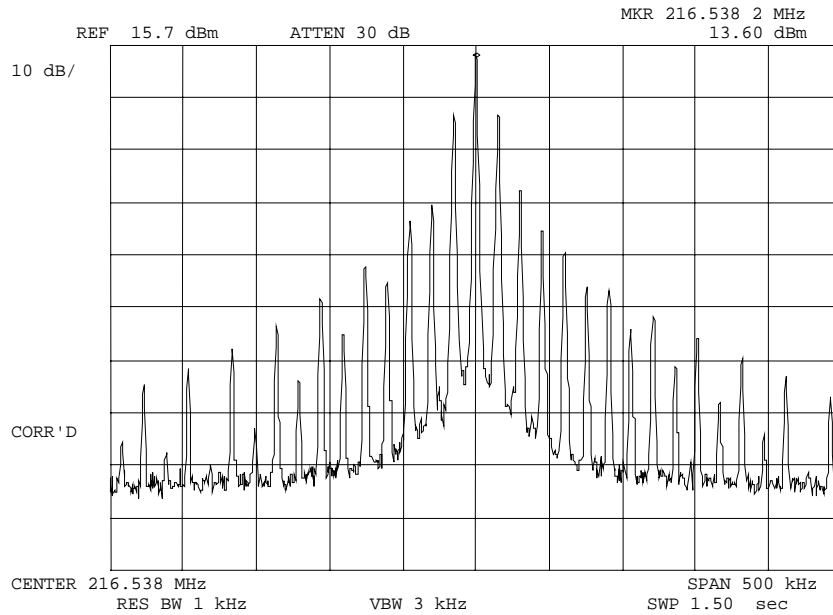
POWER:	HIGH
MODULATION:	5000 HZ @ 20 DB ABOVE REFERENCE LEVEL 99% POWER BANDWIDTH

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 18 of 30.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g0030234: 2000-Mar-29 Wed 16:48:00
STATE: 2:High Power



POWER: HIGH
MODULATION: 15000 HZ @ 20DB ABOVE REFERENCE LEVEL

SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

PAGE NO. 19 of 30.
NAME OF TEST: Modulation Limiting
SPECIFICATION: 47 CFR 2.1047(b)
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.3
TEST EQUIPMENT: As per previous page

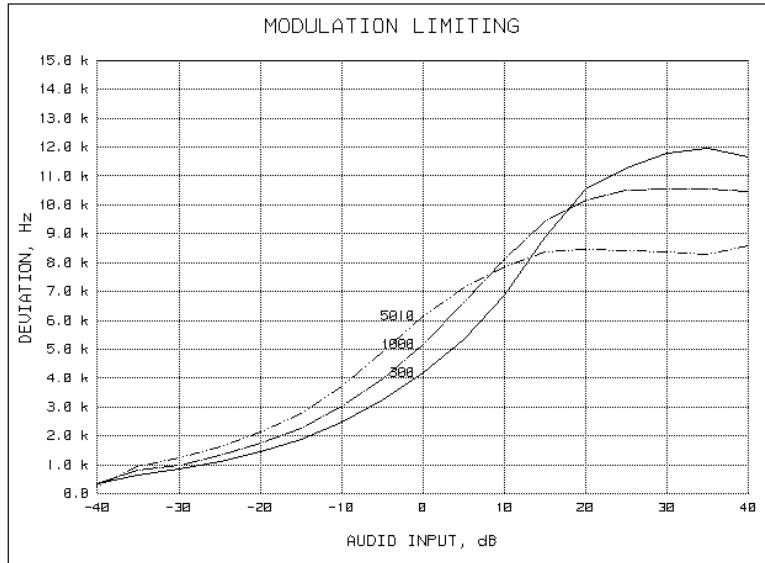
MEASUREMENT PROCEDURE

1. The signal generator was connected to the input of the EUT as for "Frequency Response of the Modulating Circuit."
2. The modulation response was measured for each of three frequencies (one of which was the frequency of maximum response), and the input voltage was varied and was observed on an HP 8901A Modulation Analyzer.
3. The input level was varied from 30% modulation (± 1.5 kHz deviation) to at least 20 dB higher than the saturation point.
4. Measurements were performed for both negative and positive modulation and the respective results were recorded.
5. MEASUREMENT RESULTS: ATTACHED

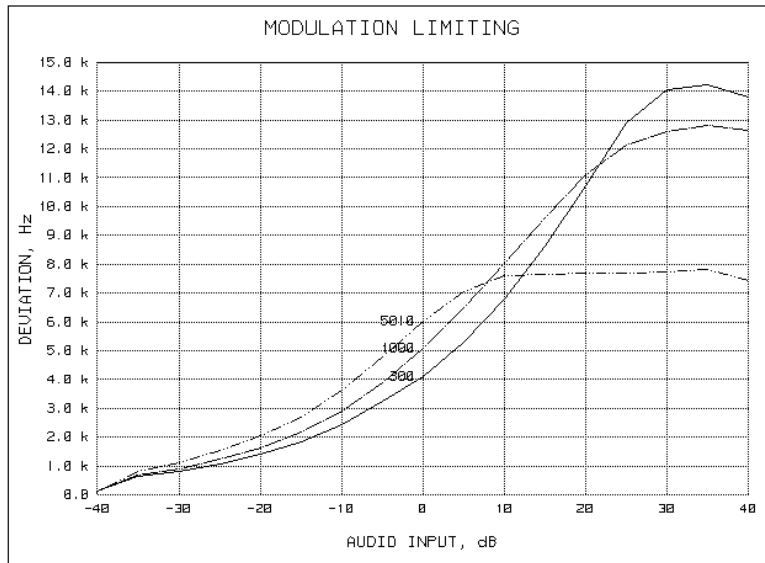
PAGE NO. 20 of 30.

NAME OF TEST: Modulation Limiting
g0030208: 2000-Mar-30 Thu 10:27:00
STATE: 0:General

Positive
Peaks:



Negative
Peaks:



SUPERVISED BY:

Morton Flom, P. Eng.

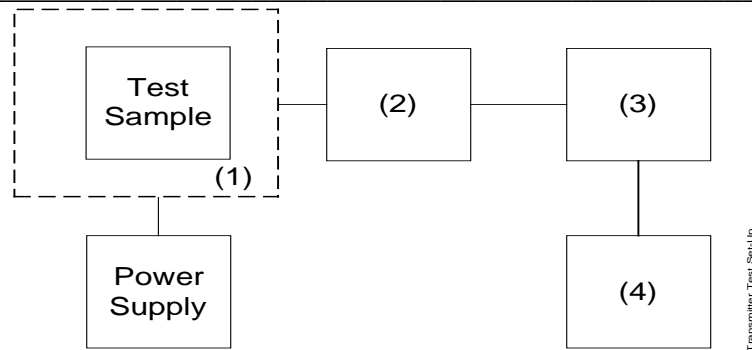
PAGE NO. 21 of 30.
NAME OF TEST: Frequency Stability (Temperature Variation)
SPECIFICATION: 47 CFR 2.1055(a)(1)
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2
TEST CONDITIONS: As Indicated
TEST EQUIPMENT: As per previous page

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

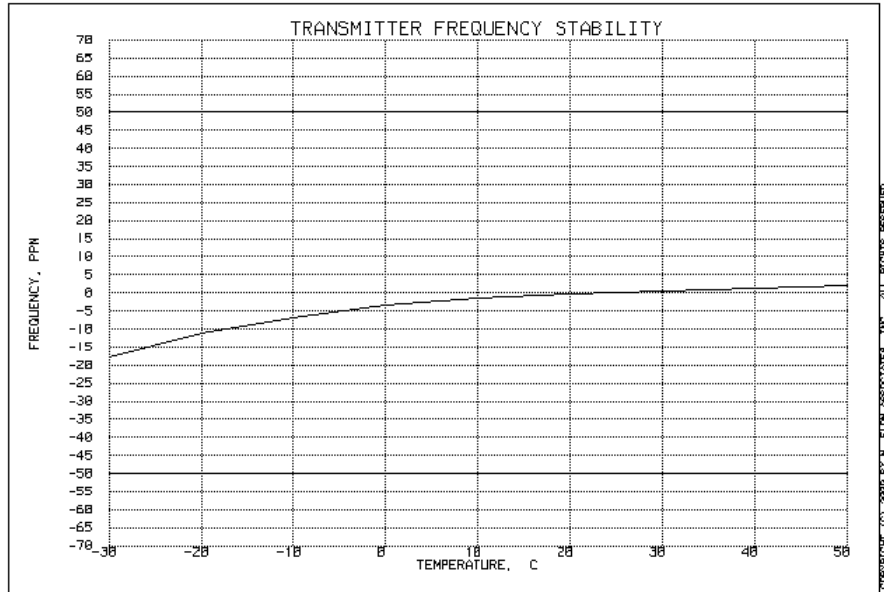
- TEST A. OPERATIONAL STABILITY
- TEST B. CARRIER FREQUENCY STABILITY
- TEST C. OPERATIONAL PERFORMANCE STABILITY
- TEST D. HUMIDITY
- TEST E. VIBRATION
- TEST F. ENVIRONMENTAL TEMPERATURE
- TEST G. FREQUENCY STABILITY: TEMPERATURE VARIATION
- TEST H. FREQUENCY STABILITY: VOLTAGE VARIATION



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

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NAME OF TEST: Frequency Stability (Temperature Variation)
g0030209: 2000-Mar-30 Thu 14:00:00
STATE: 0:General



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PAGE NO. 24 of 30.
NAME OF TEST: Frequency Stability (Voltage Variation)
SPECIFICATION: 47 CFR 2.1055(b)(1)
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

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

RESULTS: Frequency Stability (Voltage Variation)
g0030241: 2000-Mar-30 Thu 13:52:54
STATE: 0:General

LIMIT, ppm = 2.5
LIMIT, Hz = 541
BATTERY END POINT (Voltage) = 8.3

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	10.2	216.532010	10	0.05
100	12	216.532000	0	0.00
115	13.8	216.532010	10	0.05
69	8.3	216.531990	-10	-0.05

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NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 50K0F3E

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	= 15
MAXIMUM DEVIATION (D), kHz	= 10
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (B _N), kHz	= (2xM)+(2xDxK)
	= 50.0



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NAME OF TEST: Summary of Applicant Supplied Attestations

SPECIFICATION: 47 CFR 95
GUIDE: ANSI/TIA/EIA-603-1992,
TEST CONDITIONS: As Indicated
TEST EQUIPMENT: As per previous page
95.647

Antenna has no gain (as compared to a half-wave dipole) and is vertically polarized.

95.649

There are no provisions for increasing transmitter power.
95.653

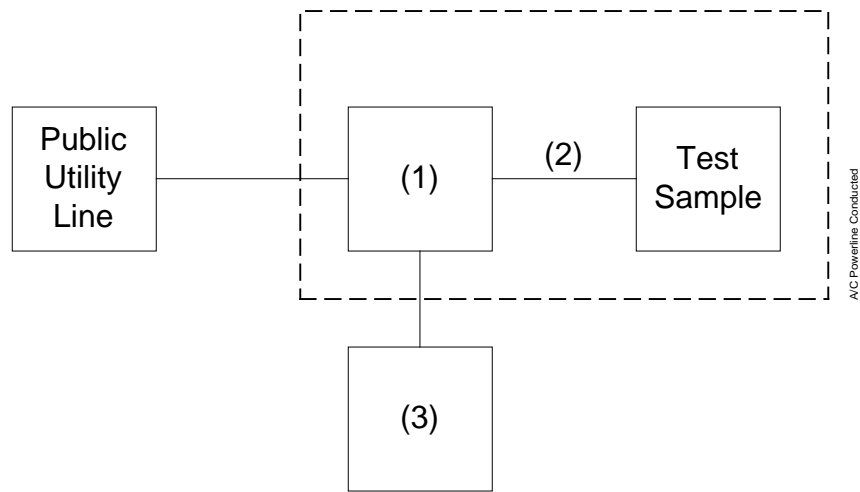
Users manual includes instructions and warnings.

PAGE NO. 27 of 30.
NAME OF TEST: A/C Powerline Conducted Emissions
SPECIFICATION: FCC: 47 CFR 15.107
GUIDE: IEEE Standard 213
TEST CONDITIONS: S. T. & H.
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A test sample was connected to the Public Utility lines through a LISN Ailtech Model 94641-1 (50 μ H).
2. A reference level of 250 μ V was set on the Spectrum Analyzer. The spectrum was searched over the range of 450 kHz to 30 MHz.
3. All other emissions were 20 dB or more below limit.
4. The test sample used a charger.
 The test sample does not use a charger.
5. Measurement Results: Attached.

AC POWERLINE CONDUCTED MEASUREMENTS



Asset	Description (as applicable)	s/n	Cycle	Last Cal
<u>(1) LINE IMPEDANCE STABILIZATION NETWORK</u>				
i00077	Singer 91221-1 (5 μ H)	0396	12 mo.	
i00155	Eaton 94641-1 (50 μ H)	178	12 mo.	Sep-99
i00167	Ailtech 94641-1 (50 μ H)	0103	12 mo.	
<u>(2) SCREEN ROOM</u>				
i00169	Lindgren 22-2/2-0	3861	N/A	none
i00170	Lindgren LG170	4999		
<u>(3) SPECTRUM ANALYZER</u>				
i00029	HP 8563E	3213A00104	12 mo.	Aug-99
i00033	HP 85462A	3625A00357	12 mo.	May-99
i00048	HP 8566B	2511AD1467	6 mo.	May-99

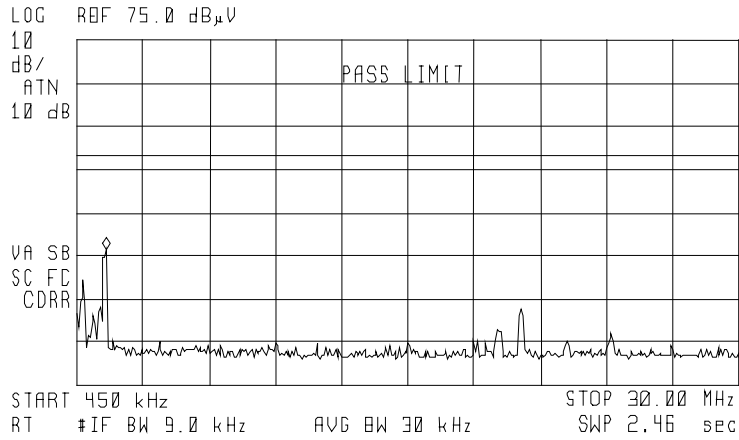
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NAME OF TEST: A/C Powerline Conducted Emissions
g0030228: 2000-Mar-28 Tue 16:14:00
STATE: 0:General



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKR 1.78 MHz
26.36 dB μ V



NEUTRAL SIDE

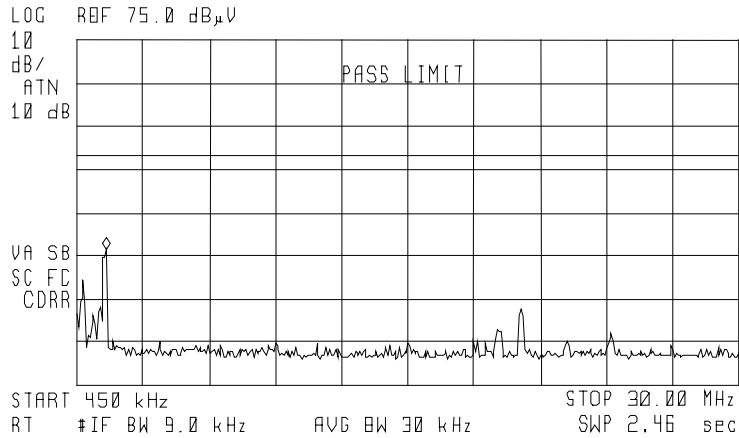
SUPERVISED BY:

Morton Flom, P. Eng.

NAME OF TEST: A/C Powerline Conducted Emissions
g0030228: 2000-Mar-28 Tue 16:14:00
STATE: 0:General



ACTV DET: PBAK
MEAS DET: PBAK QP AVG
MKR 1.78 MHz
26.36 dBμV



LINE SIDE

SUPERVISED BY:

Morton Flom, P. Eng.

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.