

KENWOOD

LSB-0219REV.A

Land Mobile Division

SERVICE BULLETIN

SUBJECT: UHF TRANSCEIVERS CAPABLE OF 406-406.1 MHz TX DATE: 09/04/98

The United States Coast Guard and NOAA have reported to the FCC an occurrence of unauthorized transmissions in the 406-406.1 MHz band. This band is reserved for use by distress beacons.

The purpose of this Service Bulletin is to remind all Kenwood Authorized Dealers and Servicers not to program the 406-406.1 MHz frequency range into any Kenwood transceiver capable of transmitting in this frequency range.

NOTE:
This bulletin has been revised to correct the frequency range.

Printed in U.S.A.

Kenwood Service Corporation 2201 E. Dominguez St. Long Beach, Ca. 90810

(310) 761-8275

(310) 605-5045 BBS

(310) 761-8290 FAX

(310) 761-4498 Direct FAX

SUPERVISED BY:

Morton Flom, P. Eng.



December 29, 1998

DATE OF REPORT

AS PER LABEL DRAWING(S)

LOCATION

ATTACHED, EXHIBIT 1.

NAMERPLATE DRAWING

FCC ID: ALH24593130

EQUIPMENT IDENTIFICATION

Sub-part
2.1033(c):

M. Flom Associates, Inc. - Global Compliance Center
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571
www.goodnet.com/~mflom, (602) 926-3100, FAX: 926-3598

FCC ID: ALH24593130

MFA

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.

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.

15.27(a) SPECIAL ACCESSORIES.

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.

15.21 INFORMATION TO USER.

THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

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

TEST REPORT

a) Laboratory: M. Flom Associates, Inc.
3356 N. San Marcos Place, Suite 107
Chandler, AZ 85224
(Canada: IC 2044)

b) Report Number: d98c0080

c) Client: Kenwood Communications Corporation
P.O. Box 22745
Long Beach, CA 90801-5745

d) Identification: TK-880-3
FCC ID: ALH24593130
UHF FM Transceiver

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

f) Report Date: December 29, 1998
EUT Received: December 7, 1998

g) h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

j) Uncertainty: In accordance with MFA internal quality manual.

k) Supervised by:

M. Flom

Morton Flom, P. Eng.

l) Results:

The results presented in this report relate only to the item tested.

m) Reproduction:

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LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

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

90

Sub-part 2.1033
(c) (1) : NAME AND ADDRESS OF APPLICANT:

Kenwood Communications Corporation
2201 E. Dominguez St
P.O. Box 22745
Long Beach, CA 90801-5745

MANUFACTURER:

Kenwood Electronics Technologies Pte. Ltd.
1 Ang Mo Kio Street 63
Singapore 569110

ALH24593130

(c) (2) : FCC ID:

MODEL NO:

TK-880-3

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

PLEASE SEE ATTACHED EXHIBITS

(c) (4) : TYPE OF EMISSION:

16K0F3E, 11K0F3E

(c) (5) : FREQUENCY RANGE, MHZ:

400 to 430
EXCEPT 406 to 406.1

(c) (6) : POWER RATING, watts:

25
Variable
Switchable
x N/A

(c) (7) : MAXIMUM POWER RATING, watts: 500

Subpart 2.1033 (continued)
 (c) (8) : VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE,
 INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual
 COLLECTOR VOLTAGE, Vdc = per manual
 SUPPLY VOLTAGE, Vdc = 13.6

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

PLEASE SEE ATTACHED EXHIBITS

(c) (10) : CIRCUIT DIAGRAM/CIRCUIT DESCRIPTION:
 including description of circuitry & devices provided for
 determining and stabilizing frequency, for suppression of
 spurious radiation, for limiting modulation and limiting
 power.

PLEASE SEE ATTACHED EXHIBITS

(c) (11) : LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

(c) (12) : PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

(c) (13) : DIGITAL MODULATION DESCRIPTION:

ATTACHED EXHIBITS
 x N/A

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

FOLLOWS

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

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

21 - Domestic Public Fixed Radio Services
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
90 - Private Operational-Fixed Microwave Service
94 - General Mobile Radio Service (GMRs)
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)
101 - Fixed Microwave Services

STANDARD TEST CONDITIONS
and
ENGINEERING PRACTICES

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

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

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

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

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 = 418.1, 400.1, 429.9

POWER SETTING	R. F. POWER, WATTS
High	25

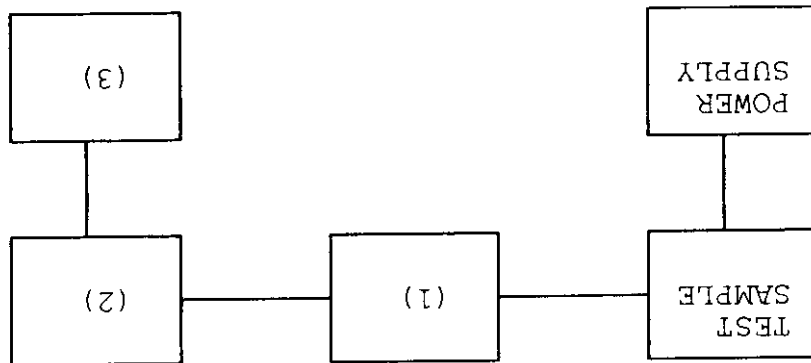
SUPERVISED BY:

Morton Flom, P. Eng.

M. Flom

TRANSMITTER POWER CONDUCTED MEASUREMENTS

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



Asset Description s/n

(1)	COAXIAL ATTENUATOR	100122 Narda 766-10	7802
		100123 Narda 766-10	7802A
		100069 Bird 8329 (30 dB)	1006
		100113 Sierra 661A-3D	1059

(2)	POWER METERS	100014 HP 435A	1733A05836
		100039 HP 436A	2709A26776
		100020 HP 8901A POWER MODE	2105A01087

(3)	FREQUENCY COUNTER	100042 HP 5383A	1628A00959
		100019 HP 5334B	2704A00347
		100020 HP 8901A FREQUENCY MODE	2105A01087

Unwanted Emissions (Transmitter Conducted)

NAME OF TEST:

47 CFR 2.1051

SPECIFICATION:

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

GUIDE:

As per attached page

TEST EQUIPMENT:

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 = 418.1, 400.1, 429.9

SPECTRUM SEARCHED, GHZ = 0 to 10 x Fc

MAXIMUM RESPONSE, HZ = 3160

ALL OTHER EMISSIONS = ≥ 20 dB BELOW LIMIT

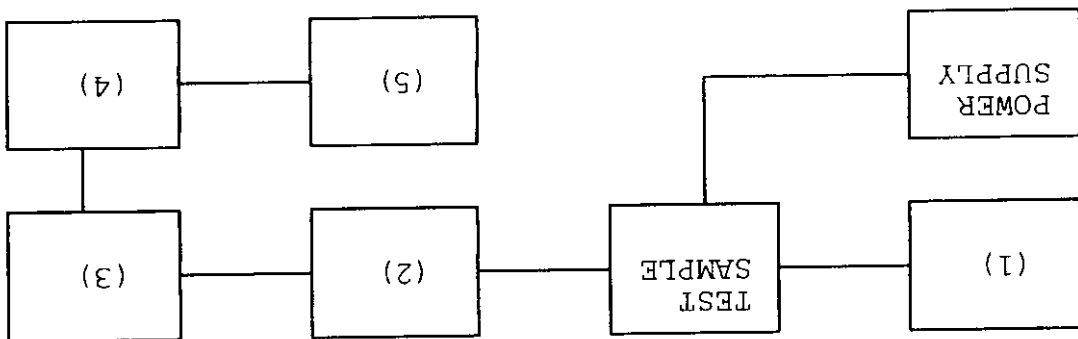
LIMIT(S), dBc
-(43+10xLOG P) = -57 (25 watts)

Am. J. Eng.
Morton Flom, P. Eng.

SUPERVISED BY:

TRANSMITTER SPURIOUS EMISSION

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



(1) AUDIO OSCILLATOR/GENERATOR
100010 HP 204D
100017 HP 8903A
100012 HP 3312A

1105A04683
2216A01753
1432A11250

(2) COAXIAL ATTENUATOR
100122 Narda 766-10
100123 Narda 766-10
100069 Bird 8329 (30 dB)
100113 Sierra 661A-3D

7802
7802A
1006
1059

(3) FILTERS; NOTCH, HP, LP, BP
100126 Eagle TNF-1
100125 Eagle TNF-1
100124 Eagle TNF-1

100-250
50-60
250-850

(4) SPECTRUM ANALYZER
100048 HP 8566B
100029 HP 8563E

2511A01467
3213A00104

(5) SCOPE
100058 HP 1741A
100030 HP 54502A
100071 Tektronix 935

2251A09356
2927A00209
1935-B011343

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 998c0195: 1998-Dec-16 Wed 11:53:00
 STATE: 2:High Power

FREQUENCY TUNED, MHZ	FREQUENCY EMISSION, MHZ	LEVEL, dbm	LEVEL, dbc	MARGIN, db
418.100000	836.260000	-21.3	-65.2	-8.3
418.100000	1254.351000	-21.4	-65.3	-8.4
418.100000	1672.371000	-19.4	-63.3	-6.4
418.100000	2090.832000	-20.3	-64.2	-7.3
418.100000	2508.534000	-22.4	-66.3	-9.4
418.100000	2926.866000	-23.8	-67.7	-10.8
418.100000	3345.234000	-23.3	-67.2	-10.3
418.100000	3762.766000	-22.4	-66.3	-9.4
418.100000	4181.187000	-23	-66.9	-10
418.100000	4599.026000	-22.3	-66.2	-9.3
418.100000	5017.223000	-22.6	-66.5	-9.6
418.100000	5435.586000	-21.5	-65.4	-8.5
418.100000	5853.652000	-17.3	-61.2	-4.3
418.100000	6271.312000	-17	-60.9	-4

NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

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.

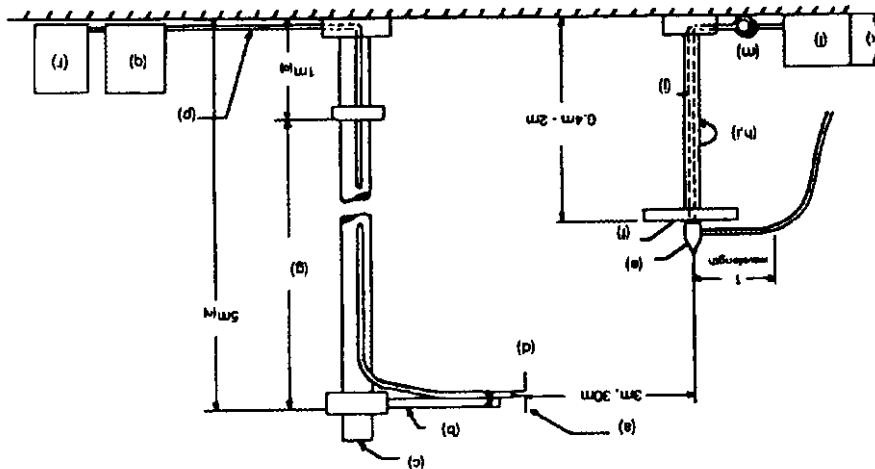
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.

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 s/n Cycle Last Cal

TRANSDUCER			
100065	EMCO 3109B 100HZ-50MHZ	2336	12 mo.
100033	Singer 94593-1 10KHZ-32MHZ	0219	12 mo.
100088	EMCO 3109-B 25MHZ-300MHZ	2336	12 mo.
100089	Apriel 2001 200MHZ-1GHZ	001500	12 mo.
100103	EMCO 3115 1GHZ-18GHZ	9208-3925	12 mo.
100085	EMCO 3116 10GHZ-40GHZ	2076	12 mo.
AMPLIFIER			
100028	HP 8449A	2749A00121	12 mo.
SPECTRUM ANALYZER			
100029	HP 8563E	3213A00104	12 mo.
100033	HP 85462A	3625A00357	12 mo.
100048	HP 8566B	2511AD1467	6 mo.
MFA p98c0003, p98c0080			

SUPERVISED BY:

Morton Flom, P. Eng.

M. Flom P. Eng.

2nd to 10th

<-60

EMISSION, MHZ/HARMONIC

SPURIOUS LEVEL, dBc

ALL OTHER EMISSIONS

= $\geq$ 20 dB BELOW LIMIT

NAME OF TEST:

Field Strength of Spurious Radiation

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Emission Masks (Occupied Bandwidth)

NAME OF TEST:

47 CFR 2.1049(c) (1)

SPECIFICATION:

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

GUIDE:

TEST EQUIPMENT:

As per previous page

MEASUREMENT PROCEDURE

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

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

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

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

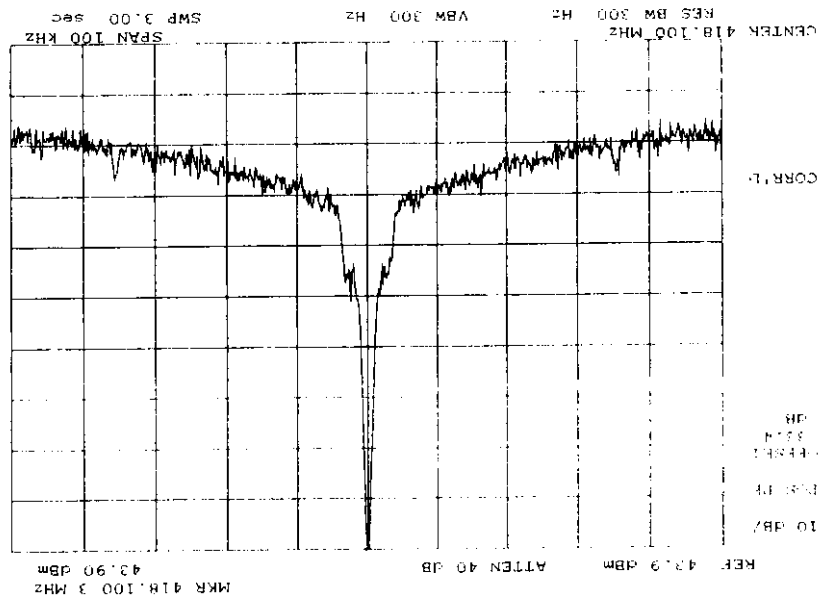
5. MEASUREMENT RESULTS: ATTACHED

SUPERVISED BY:

Morton Flom, P. Eng.

Dr. Bruce Perry

POWER: HIGH
MODULATION: NONE



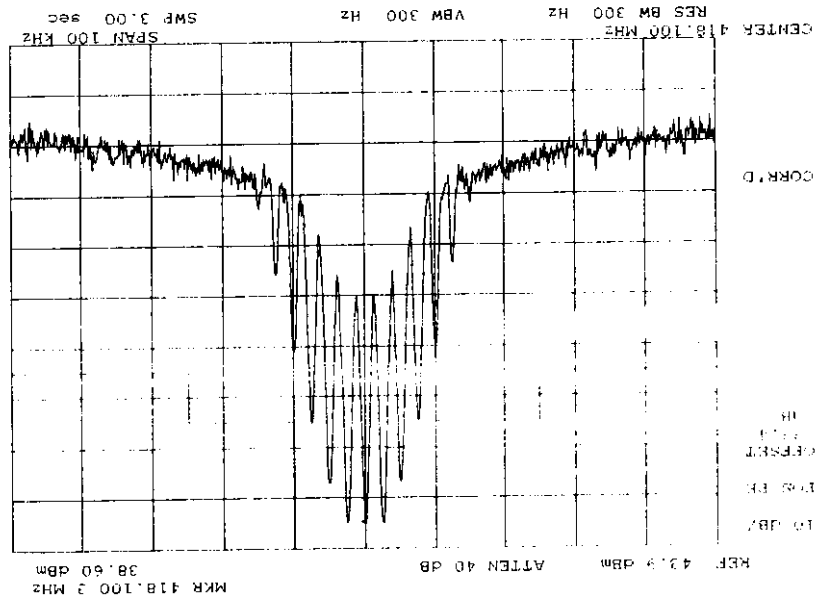
NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98c0192: 1998-Dec-16 Wed 10:49:00
STATE: 2:High Power

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g98c0193: 1998-Dec-16 Wed 10:51:00
 STATE: 2:High Power



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

Morton Flom, P. Eng.

Morton Flom

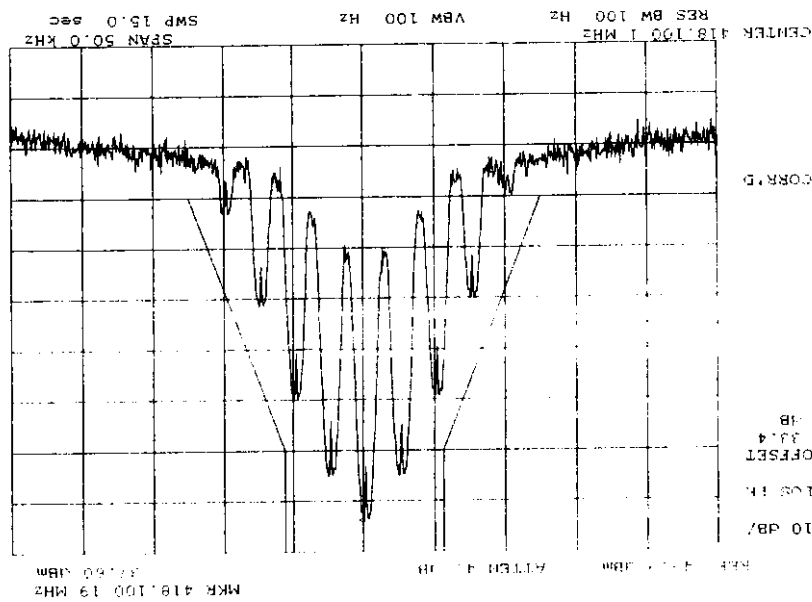
SUPERVISED BY:

SUPERVISED BY:

Morton Flom, P. Eng.

Am. Mus. Nat. Hist.

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



NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98c0194: 1998-Dec-16 Wed 11:31:00
STATE: 2:High Power

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NAME OF TEST: Transient Frequency Behavior

SPECIFICATION: 47 CFR 90.214

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

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

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

2. The transmitter was turned on.

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

4. The transmitter was turned off.

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

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

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

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

LEVELS MEASURED:

step f, dbm
step h, dbm
step l, dbm

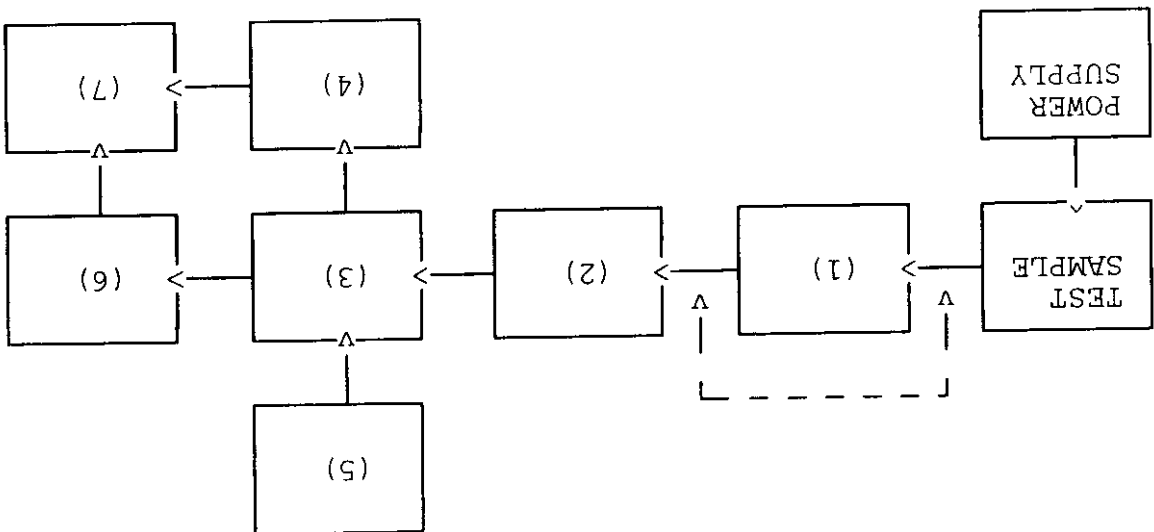
= -7.6
= -27.6
= 22.6

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SUPERVISED BY:

TRANSIENT FREQUENCY BEHAVIOR



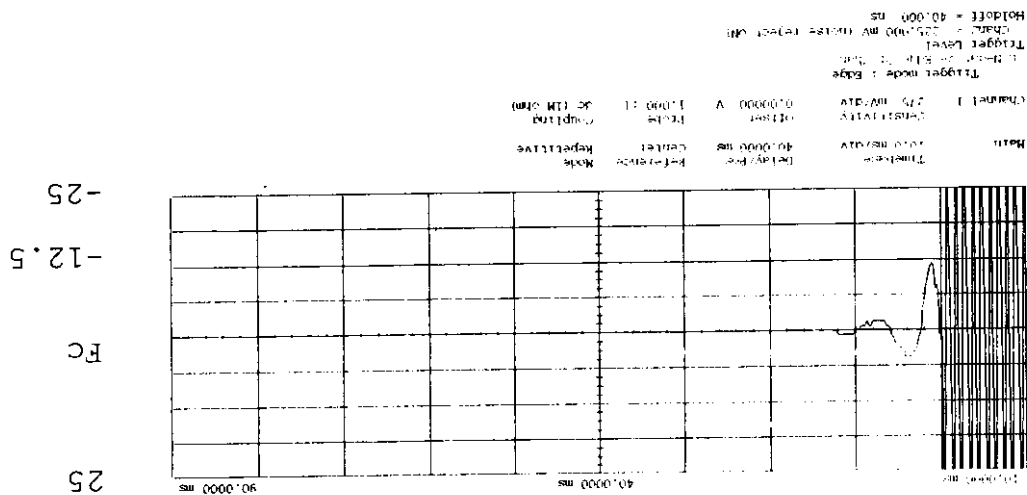
Asset Description s/n

(1) ATTENUATOR (Removed after 1st step)	x 100112 Philco 30 dB	989
(2) ATTENUATOR	100112 Philco 30 dB	989
	100172 Bird 30 dB	989
	100122 Narda 10 dB	7802
	100123 Narda 10 dB	7802A
	100110 Kay Variable	145-387
(3) COMBINER	x 100154 4 x 25 Ω COMBINER	154
(4) CRYSTAL DETECTOR	x 100159 HP 8470B	1822A10054
(5) RF SIGNAL GENERATOR	100018 HP 8656A	2228A03472
	100031 HP 8656A	2402A06180
	100067 HP 8920A	3345U01242
(6) MODULATION ANALYZER	x 100020 HP 8901A	2105A01087
(7) SCOPE	x 100030 HP 54502A	2927A00209

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NAME OF TEST: Transient Frequency Behavior
 998c0196: 1998-Dec-16 Wed 12:10:00
 STATE: 0:General



POWER: MODULATION: DESCRIPTION:
 n/a Ref Gen=25 KHz Deviation
 CARRIER ON TIME

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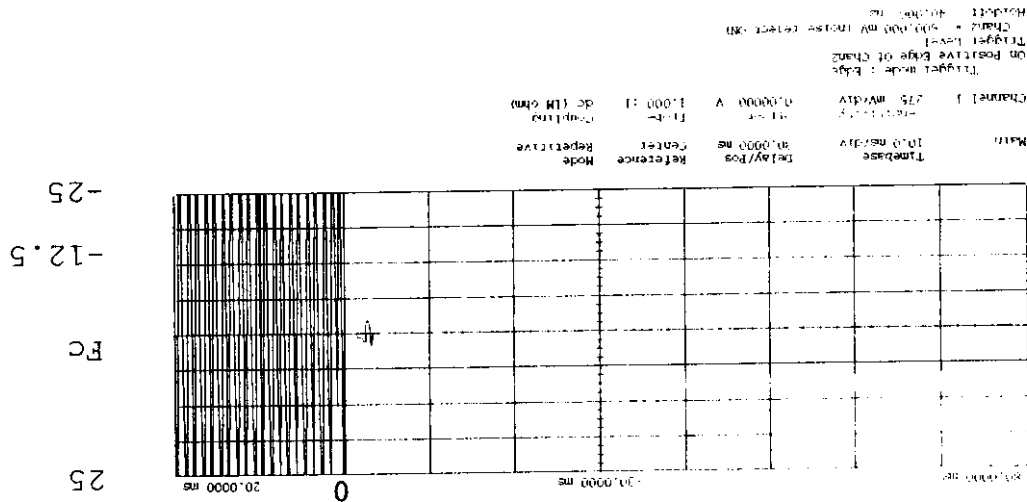
M. Flom

SUPERVISED BY:

PAGE NO.

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NAME OF TEST: Transient Frequency Behavior
 998c0197: 1998-Dec-16 Wed 12:12:00
 STATE: 0:General



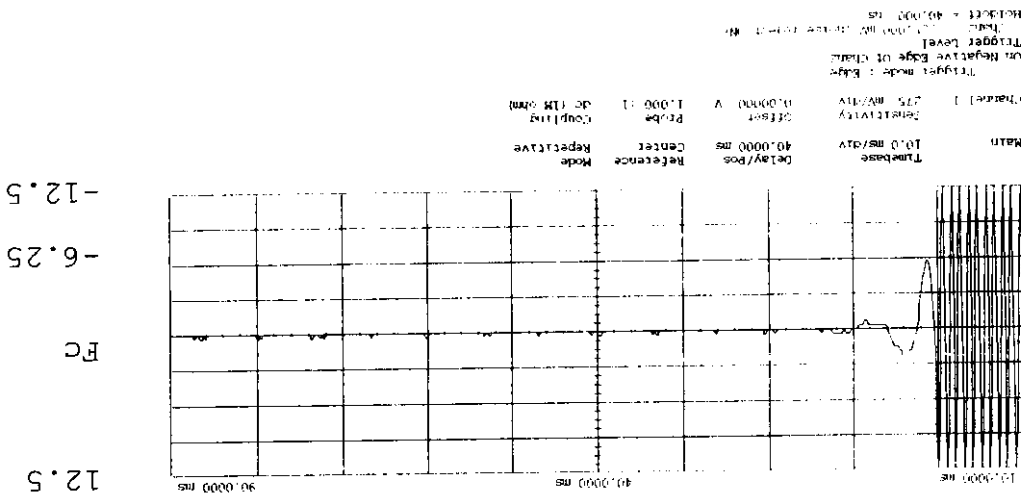
POWER:
 MODULATION:
 DESCRIPTION:
 Ref Gen=25 KHz Deviation
 CARRIER OFF TIME
 n/a

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NAME OF TEST: Transient Frequency Behavior
 998c0200: 1998-Dec-16 Wed 12:18:00
 STATE: 0:General



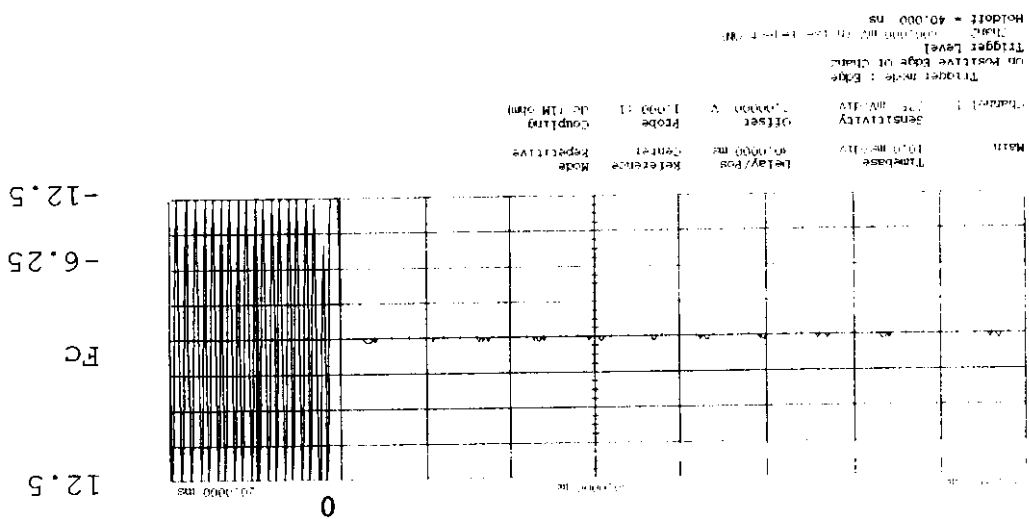
POWER:
 MODULATION:
 DESCRIPTION:
 n/a
 Ref Gen=12.5 KHz Deviation
 CARRIER ON TIME

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SUPERVISED BY:

NAME OF TEST: Transient Frequency Behavior
998c0201: 1998-Dec-16 Wed 12:20:00
STATE: 0:General



POWER:
MODULATION:
DESCRIPTION:
n/a
Ref Gen=12.5 KHz Deviation
CARRIER OFF TIME

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SUPERVISED BY:

NAME OF TEST:

Audio Low Pass Filter (Voice Input)

SPECIFICATION:

47 CFR 2.1047(a)

GUIDE:

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

TEST EQUIPMENT:

As per attached page

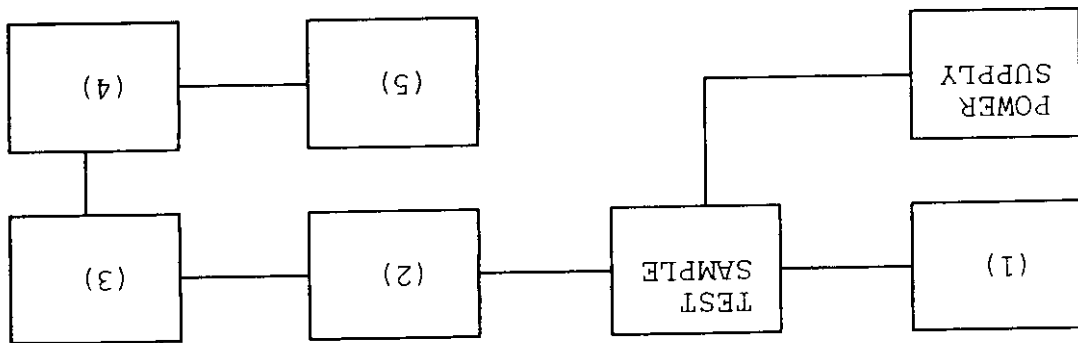
MEASUREMENT PROCEDURE

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

3. MEASUREMENT RESULTS: ATTACHED

TRANSMITTER TEST SET-UP

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



Asset Description s/n

(1) LINE IMPEDANCE STABILIZATION NETWORK
 100010 HP 204D
 100017 HP 8903A
 100118 HP 33120A
 1105A04683
 2216A01753
 US36002064

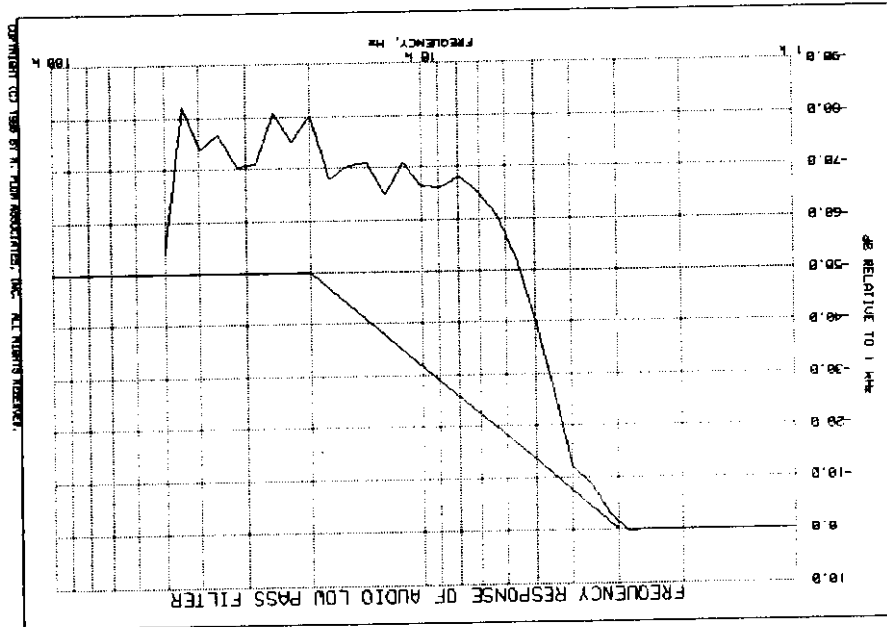
(2) COAXIAL ATTENUATOR
 100122 NARDA 766-10
 100123 NARDA 766-10
 100113 SIERRA 661A-3D
 100069 BIRD 8329 (30 dB)
 10066
 1059
 7802A
 7802

(3) MODULATION ANALYZER
 100020 HP 8901A
 2105A01087

(4) AUDIO ANALYZER
 100017 HP 8903A
 2216A01753

(5) SCOPE
 100058 HP 1741A
 100071 Tektronix 935
 2215A09356
 1935-B011343

NAME OF TEST: Audio Low Pass Filter (Voice Input)
 998c0036: 1998-Dec-08 Tue 07:35:00
 STATE: 0:General



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Audio Frequency Response

NAME OF TEST:

47 CFR 2.1047(a)

SPECIFICATION:

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

GUIDE:

As per previous page

TEST EQUIPMENT:

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.

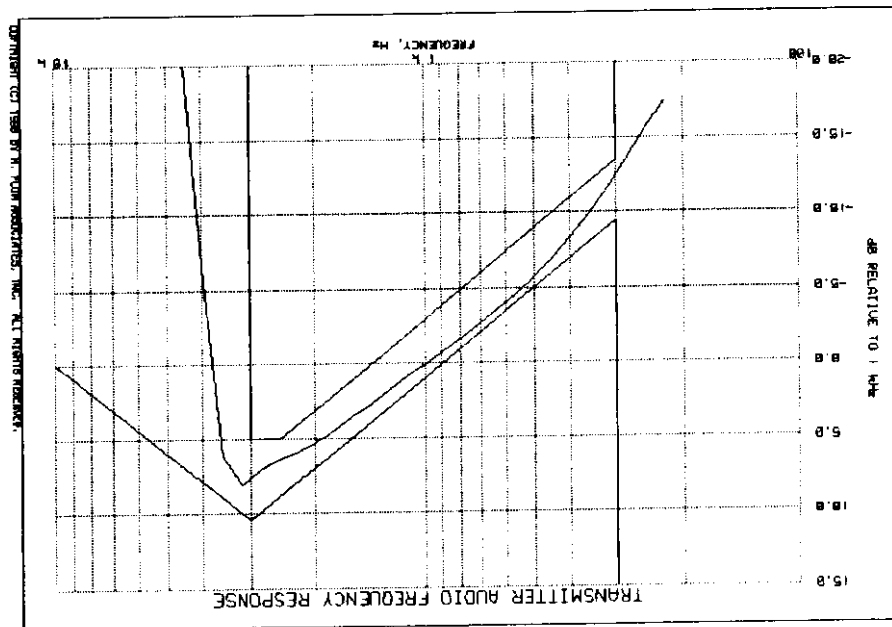
3. The audio signal input was adjusted to obtain 20% modulation at 1 kHz, and this point was taken as the 0 dB reference level.

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

NAME OF TEST: Audio Frequency Response
 998c0037: 1998-Dec-08 Tue 07:38:00
 STATE: 0:General



Additional points:

FREQUENCY, Hz	LEVEL, dB
300	-12.51
20000	-27.11
30000	-27.45
50000	-27.38

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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

MEASUREMENT PROCEDURE

PAGE NO. 29 of 37.

NAME OF TEST: Modulation Limiting

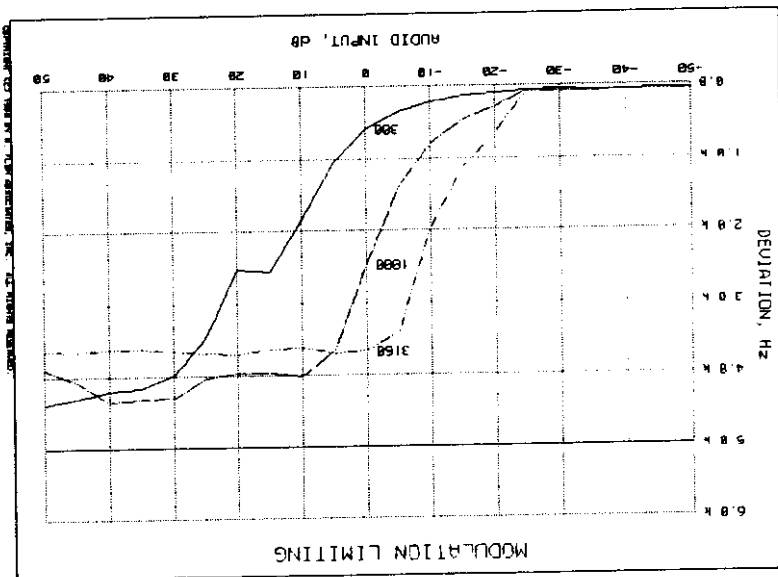
SPECIFICATION: 47 CFR 2.1047(b)

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

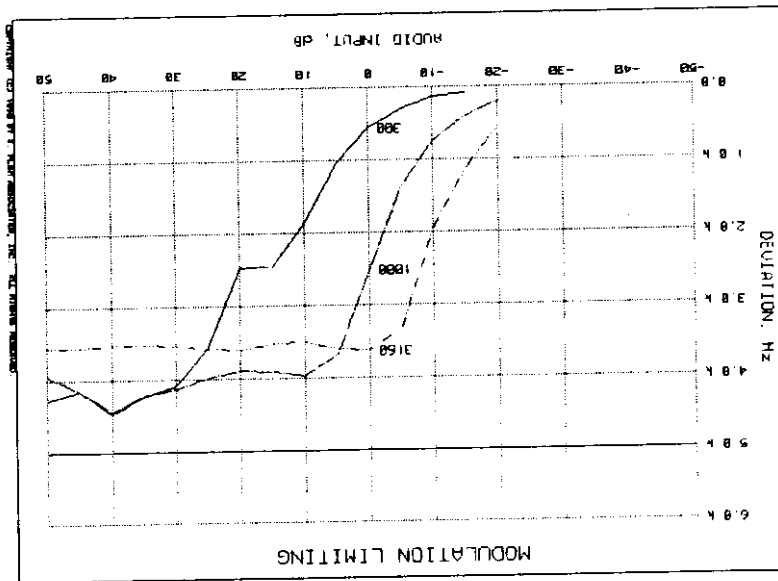
TEST EQUIPMENT: As per previous page

NAME OF TEST: Modulation Limiting
g98c0038: 1998-Dec-08 Tue 07:44:00
STATE: 0:General

Positive
Peaks:



Negative
Peaks:



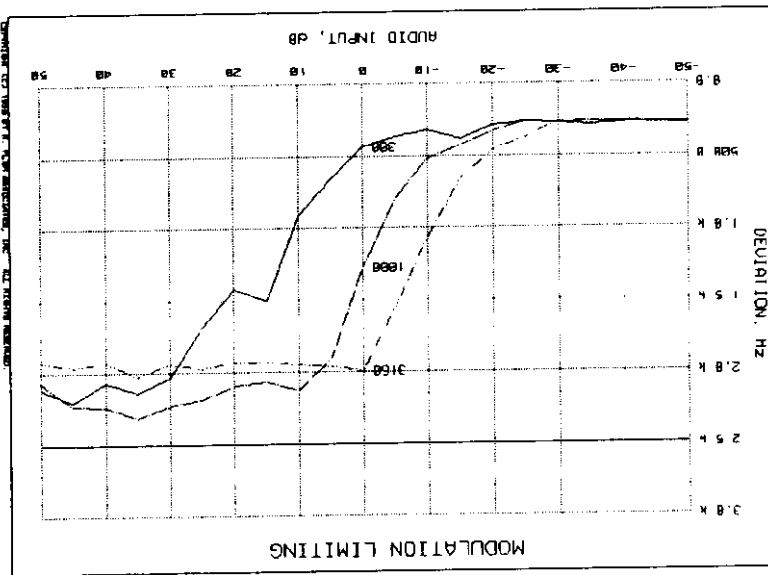
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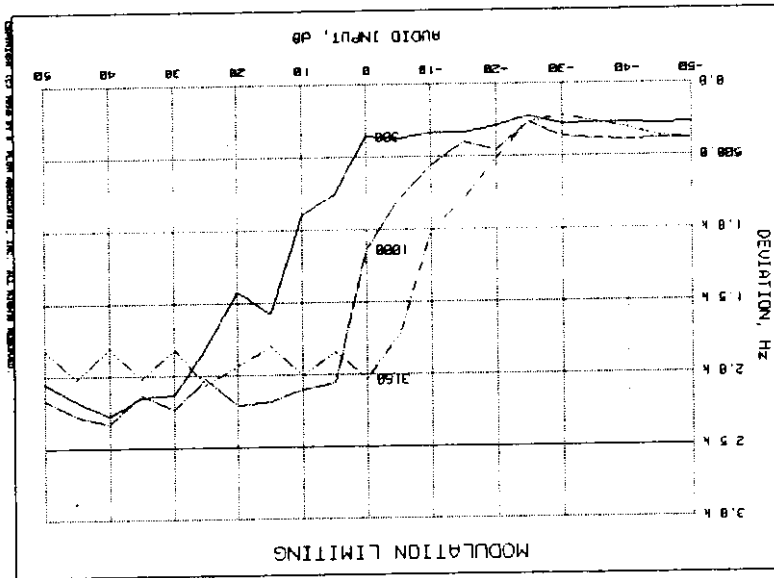
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NAME OF TEST: Modulation Limiting
g98c0044: 1998-Dec-08 Tue 08:04:00
STATE: 0:General

Positive
Peaks:



Negative
Peaks:



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PAGE NO.	32 of 37.
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.

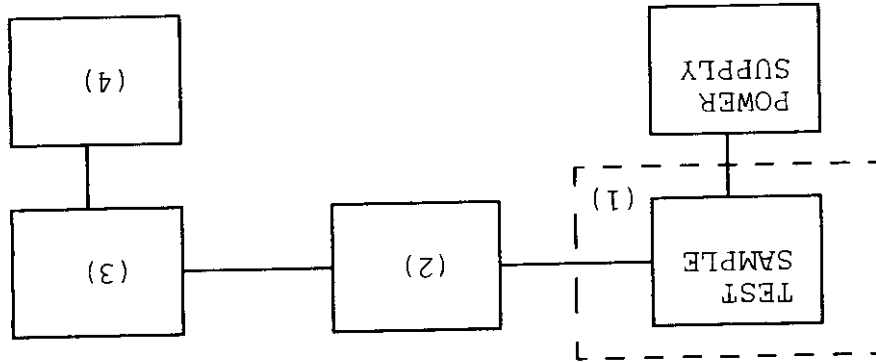
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

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



(1) TEMPERATURE, HUMIDITY, VIBRATION
 x 100027 Tenny Temp. Chamber
 100 Weber Humidity Chamber
 100 L.A.B. RVH 18-100
 9083-765-234

(2) COAXIAL ATTENUATOR
 100122 NARDA 766-10
 100123 NARDA 766-10
 100113 SIERRA 661A-3D
 100069 BIRD 8329 (30 dB)
 10066

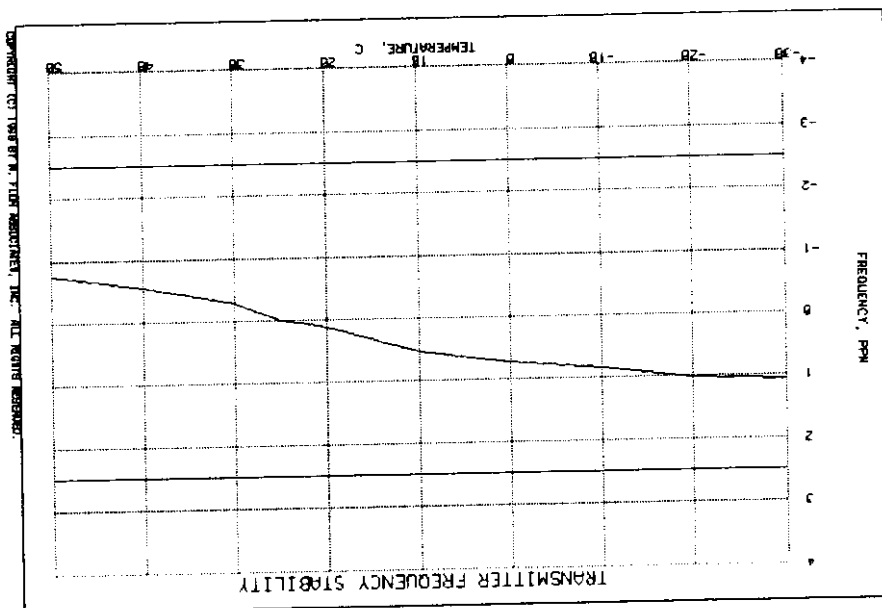
(3) R.F. POWER
 100014 HP 435A POWER METER
 100039 HP 436A POWER METER
 100020 HP 8901A POWER METER
 1733A05839
 2709A26776
 2105A01087

(4) FREQUENCY COUNTER
 100042 HP 5383A
 100019 HP 5334B
 100020 HP 8901A
 1628A00959
 2704A00347
 2105A01087

PAGE NO.

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NAME OF TEST: Frequency Stability (Temperature Variation)
g98c0165: 1998-Dec-17 Thu 13:34:00
STATE: 0:General



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PAGE NO.

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NAME OF TEST:

Frequency Stability (Voltage Variation)

SPECIFICATION:

47 CFR 2.1055(b) (1)

GUIDE:

ANSI/TIA/EIA-603-1992, Paragraph 2.2.2

TEST EQUIPMENT:

As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.

2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.

3. The variation in frequency was measured for the worst case.

RESULTS: Frequency Stability (Voltage Variation)
 998c0047: 1998-Dec-08 Tue 08:20:27
 STATE: 0:General

LIMIT, ppm = 2.5
 LIMIT, Hz = 1045
 BATTERY END POINT (Voltage) = 9.2

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	11.73	418.100010	10	0.02
100	13.8	418.100000	0	0.00
115	15.87	418.100000	0	0.00
67	9.2	418.100000	0	0.00

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Necessary Bandwidth and Emission Bandwidth

NAME OF TEST:

47 CFR 2.202 (g)

SPECIFICATION:

MODULATION = 16K0F3E
 NECESSARY BANDWIDTH CALCULATION:
 $\frac{\text{MAXIMUM MODULATION (M), KHz}}{\text{MAXIMUM DEVIATION (D), KHz}} = 5$
 $\frac{\text{CONSTANT FACTOR (K)}}{\text{NECESSARY BANDWIDTH (B_N), KHz}} = 1$
 $(2 \times M) + (2 \times D \times K) = 16.0$

MODULATION = 11K0F3E
 NECESSARY BANDWIDTH CALCULATION:
 $\frac{\text{MAXIMUM MODULATION (M), KHz}}{\text{MAXIMUM DEVIATION (D), KHz}} = 2.5$
 $\frac{\text{CONSTANT FACTOR (K)}}{\text{NECESSARY BANDWIDTH (B_N), KHz}} = 1$
 $(2 \times M) + (2 \times D \times K) = 11.0$

M. J. Flom

Morton Flom, P. Eng.

SUPERVISED BY:

CERTIFYING ENGINEER:

Morton Flom, P. Eng.



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.

THIS IS TO CERTIFY THAT:

TESTIMONIAL
AND
STATEMENT OF CERTIFICATION

STATEMENT OF QUALIFICATIONS

EDUCATION:

1. B. ENG. in ENGINEERING PHYSICS, 1949, MCGILL University, Montreal, Canada.
2. Post Graduate Studies, McGill University & Sir George Williams University, Montreal.

PROFESSIONAL AFFILIATIONS:

1. ARIZONA SOCIETY OF PROFESSIONAL ENGINEERS (NSPE), #026 031 821.
2. ORDER OF ENGINEERS (QUEBEC) 1949. #45 34.
3. ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOPHYSICISTS & GEOLOGISTS OF ALBERTA #5916.
4. REGISTERED ENGINEERING CONSULTANT - GOVERNMENT OF CANADA, DEPARTMENT OF COMMUNICATIONS. Radio Equipment approvals.
5. IEEE, Lifetime member no. 041/204 (Member since 1947).

EXPERIENCE:

1. Research/Development/Senior Project Engineer. R.C.A. LIMITED (4 years).
2. Owner/Chief Engineer of Electronics. Design/Manufacturing & Cable TV Companies (10 years)
3. CONSULTING ENGINEER (over 25 years).

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