

SUPERVISED BY:

Morton Flom, P. Eng.

M. Flom

November 18, 1998

DATE OF REPORT

AS PER LABEL DRAWING(S)

LOCATION

ATTACHED, EXHIBIT 1.

NAMEPLATE DRAWING

FCC ID: ALH24623110

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

MFG

FCC ID: ALH24623110

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>PAGE</u>	<u>DESCRIPTION</u>	<u>RULE</u>
1	Test Report	2.1033(c)
2	General Information Required	2.1033(c) (14)
4	Rule Summary	
5	Standard Test Conditions and Engineering Practices	
6	Carrier Output Power (Conducted)	2.1046(a)
8	Unwanted Emissions (Transmitter Conducted)	2.1051
12	Field Strength of Spurious Radiation	2.1053(a)
15	Emission Masks (Occupied Bandwidth)	2.1049(c) (1)
22	Transient Frequency Behavior	90.214
28	Audio Low Pass Filter (Voice Input)	2.1047(a)
31	Audio Frequency Response	2.1047(a)
34	Modulation Limiting	2.1047(b)
39	Frequency Stability (Temperature Variation)	2.1055(a) (1)
42	Frequency Stability (Voltage Variation)	2.1055(b) (1)
43	Necessary Bandwidth and Emission Bandwidth	2.202(g)

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

b) Laboratory: (FCC: 31040/SIT)
(Canada: IC 2044)

c) Report Number: d98b0047
Kenwood Communications Corporation
P.O. Box 22745
Long Beach, CA 90801-5745

e) Identification: TK-380
FCC ID: ALH24623110
UHF FM Handheld Transceiver
f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: November 18, 1998
EUT Received: November 11, 1998

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

i) Sampling method: No sampling procedure used.
j) 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.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

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

22, 74, 80, 90, 95

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

VENDOR:

Kenwood Communications Corporation
P.O. Box 22745
Long Beach, CA 90801-5745

(c) (2) : FCC ID:

ALH24623110

MODEL NO:

TK-380

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

PLEASE SEE ATTACHED EXHIBITS

(c) (4) : TYPE OF EMISSION:

16K0F3E, 11K0F3E

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

450 to 490

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

1, 4, N/A
Variable
X Switchable

(c) (7) : MAXIMUM POWER RATING, Watts: 4W PT. 80 / 500W

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

COLLECTOR CURRENT, A = per manual
 COLLECTOR VOLTAGE, Vdc = per manual
 SUPPLY VOLTAGE, Vdc = 7.5 V

(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	x
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	x
80 - Stations in the Maritime Services	x
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	x
94 - Private Operational-Fixed Microwave Service	
95 Subpart A - General Mobile Radio Service (GMRS)	x
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

5 of 43.

PAGE NO.

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.

SUPERVISED BY:

Morton Flom, P. Eng.

M. Flom

POWER SETTING	Low	High
R. F. POWER, WATTS	1	4

FREQUENCY OF CARRIER, MHZ = 470.1, 450.1, 489.9

MEASUREMENT RESULTS
(Worst case)

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 PROCEDURE

PAGE NO. 6 of 43.

NAME OF TEST: Carrier Output Power (Conducted)

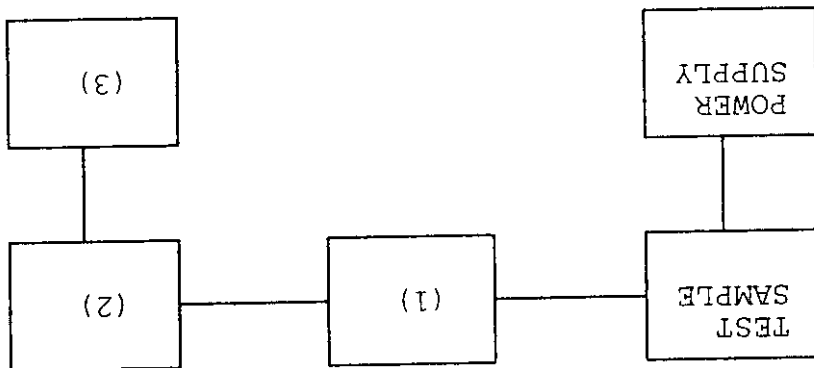
SPECIFICATION: 47 CFR 2.1046(a)

GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.1

TEST EQUIPMENT: As per attached page

TRANSMITTER POWER CONDUCTED MEASUREMENTS

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



Asset Description s/n

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

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

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

8 of 43.

PAGE NO.

Unwanted Emissions (Transmitter Conducted)

47 CFR 2.1051

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

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 = 470.1, 450.1, 489.9
 SPECTRUM SEARCHED, GHZ = 0 to 10 x Fc
 MAXIMUM RESPONSE, HZ = 3160
 ALL OTHER EMISSIONS = ≥ 20 dB BELOW LIMIT
 LIMIT(S), dBc
 $-(43+10 \times \text{LOG P}) = -43$ (1 watt)
 $-(43+10 \times \text{LOG P}) = -49$ (4 watts)

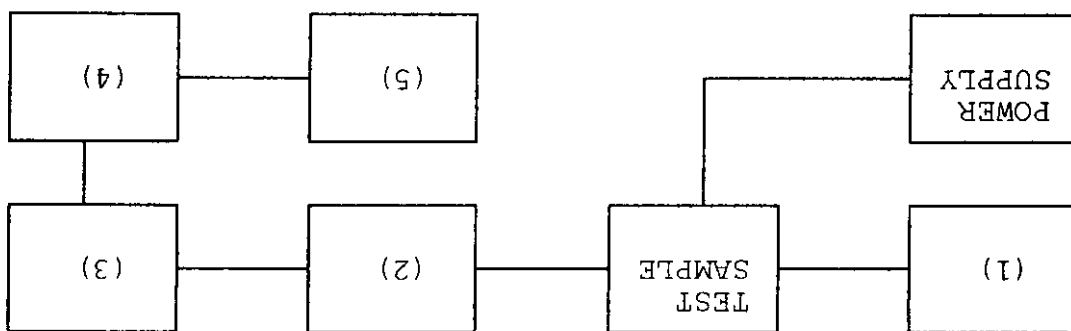
Morton Flom, P. Eng.



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
1059	
1006	
7802A	
7802	

(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	

Unwanted Emissions (Transmitter Conducted)

NAME OF TEST: 998b0191: 1998-Nov-13 Fri 10:35:00

STATE: 1: Low Power

FREQUENCY TUNED, MHZ	FREQUENCY LEVEL, dBm	LEVEL, dbc	MARGIN, dB
470.100000	940.208000	-47.7	-34.7
470.100000	1409.816000	-50.9	-37.9
470.100000	1880.414000	-47.6	-34.6
470.100000	2350.585000	-49.6	-36.6
470.100000	2821.000000	-51.6	-38.6
470.100000	3290.843000	-51.4	-38.4
470.100000	3760.565000	-53.1	-40.1
470.100000	4231.200000	-53.5	-40.5
470.100000	4701.382000	-52.7	-39.7
470.100000	5170.615000	-51.3	-38.3
470.100000	5641.688000	-52.3	-39.3
470.100000	6110.820000	-46	-33
470.100000	6581.396000	-46.5	-33.5
470.100000	7051.599000	-46.4	-33.4
470.100000		-77.7	
470.100000		-80.9	
470.100000		-77.6	
470.100000		-79.6	
470.100000		-81.6	
470.100000		-81.4	
470.100000		-83.1	
470.100000		-83.5	
470.100000		-82.7	
470.100000		-81.3	
470.100000		-82.3	
470.100000		-76	
470.100000		-76.5	
470.100000		-76.4	

PAGE NO.

11 of 43.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 998b0192: 1998-Nov-13 Fri 10:33:00
 STATE: 2: High Power

FREQUENCY TUNED, MHZ	FREQUENCY LEVEL, dbm	LEVEL, dbc	MARGIN, db
470.100000	939.922000	-42.7	-29.7
470.100000	1410.526000	-42.4	-29.4
470.100000	1880.198000	-41.9	-28.9
470.100000	2350.855000	-39.7	-26.7
470.100000	2820.966000	-43.1	-30.1
470.100000	3290.821000	-43.5	-30.5
470.100000	3760.579000	-44.5	-31.5
470.100000	4230.597000	-44.3	-31.3
470.100000	4701.442000	-43.8	-30.8
470.100000	5171.564000	-43.2	-30.2
470.100000	5641.256000	-44.1	-31.1
470.100000	6111.399000	-38.2	-25.2
470.100000	6581.570000	-38.2	-25.2
470.100000	7051.387000	-38.6	-25.6
470.100000	74.6	-74.6	-25.6
470.100000	74.2	-74.2	-25.2
470.100000	74.2	-74.2	-25.2
470.100000	80.1	-80.1	-31.1
470.100000	79.2	-79.2	-30.2
470.100000	79.8	-79.8	-30.8
470.100000	80.3	-80.3	-31.3
470.100000	80.5	-80.5	-31.5
470.100000	79.5	-79.5	-30.5
470.100000	79.1	-79.1	-30.1
470.100000	75.7	-75.7	-26.7
470.100000	77.9	-77.9	-28.9
470.100000	78.4	-78.4	-29.4
470.100000	78.7	-78.7	-29.7

Field Strength of Spurious Radiation

47 CFR 2.1053(a)

ANSI/TIA/EIA-603-1992, Paragraph 2.2.12

As per attached page

MEASUREMENT PROCEDURE

PAGE NO.

NAME OF TEST:

SPECIFICATION:

GUIDE:

TEST EQUIPMENT:

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

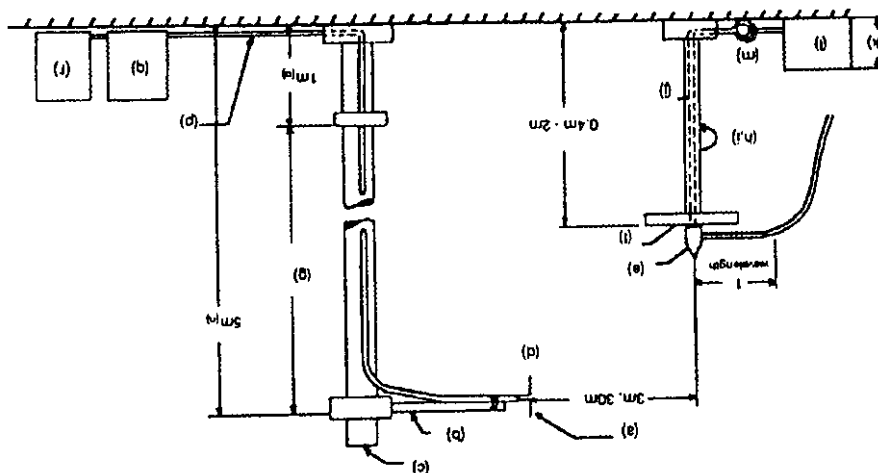
4. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.

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', 1 m normally
(p) Calibrated cable at least 10m in length
(q) Amplifier (optional)
(r) Spectrum Analyzer

Asset	Description	s/n	Cycle	Last Cal

Ref: AMST C63-4-1992, 10.1.4

TRANSUCER					
	100065	EMCO 3109B 100HZ-50MHZ	2336	12 mo.	
	100033	Singer 94593-1 10KHZ-32MHZ	0219	12 mo.	
x	100088	EMCO 3109-B 25MHZ-300MHZ	2336	12 mo.	Oct-98
x	100089	Apriel 2001 200MHZ-1GHZ	001500	12 mo.	Oct-98
x	100103	EMCO 3115 1GHZ-18GHZ	9208-3925	12 mo.	Oct-98
	100085	EMCO 3116 10GHZ-40GHZ	2076	12 mo.	
AMPLIFIER					
	100028	HP 8449A	2749A00121	12 mo.	Mar-98
SPECTRUM ANALYZER					
	100029	HP 8563E	3213A00104	12 mo.	
	100033	HP 85462A	3625A00357	12 mo.	Dec-97
x	100048	HP 8566B	2511AD1467	6 mo.	Mar-98

SUPERVISED BY:

Morton Flom, P. Eng.

M. Flom P. Eng.

2nd to 10th

<-75

<-70

Low

High

EMISSION, MHZ/HARMONIC

SPURIOUS LEVEL, dbc

ALL OTHER EMISSIONS = $\geq$ 20 DB BELOW LIMIT

NAME OF TEST: Field Strength of Spurious Radiation

14 of 43.

PAGE NO.

Emission Masks (Occupied Bandwidth)

NAME OF TEST:

47 CFR 2.1049(c) (1)

SPECIFICATION:

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

GUIDE:

As per previous page

TEST EQUIPMENT:

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.

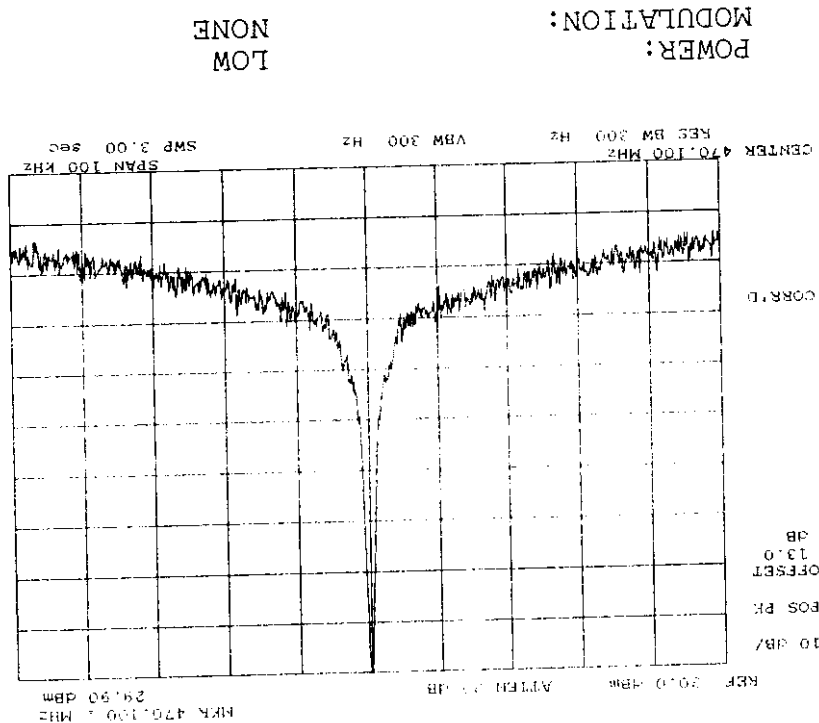
4. The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

5. MEASUREMENT RESULTS: ATTACHED

PAGE NO.

16 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
 STATE: 1:Low Power
 g98b0185: 1998-Nov-13 Fri 10:20:00



Morton Flom, P. Eng.

M. Flom

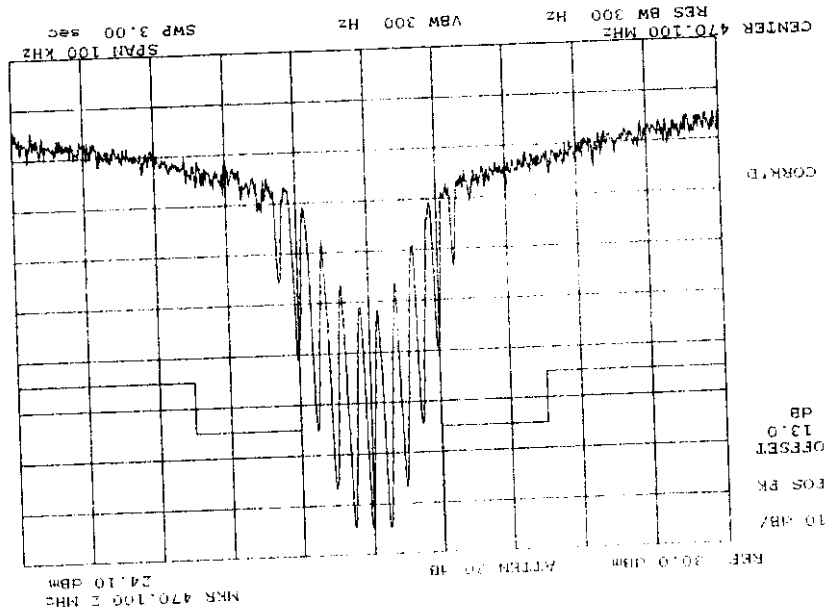
SUPERVISED BY:

MFA 98B0005, 98B0047

PAGE NO.

17 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
 STATE: 1:Low Power
 9980186: 1998-Nov-13 Fri 10:24:00



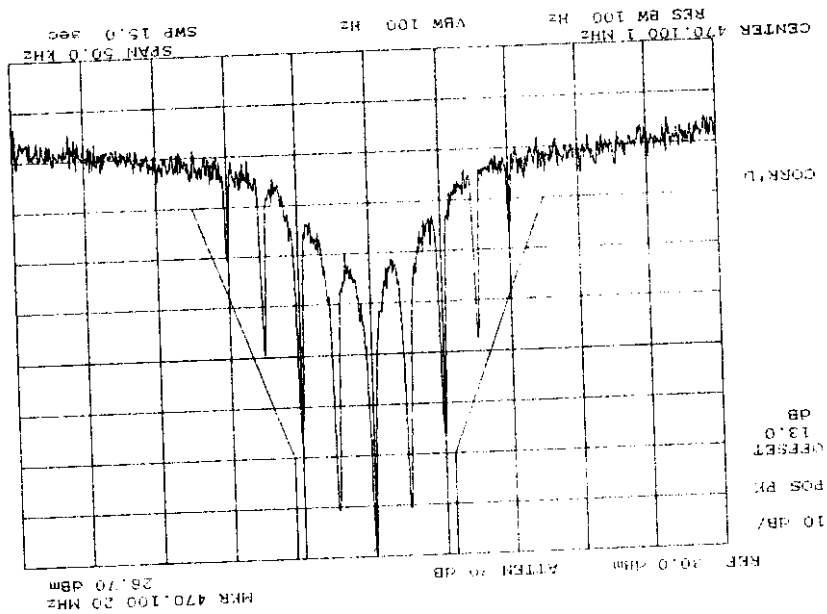
POWER:
 MODULATION:
 LOW
 VOICE: 2500 HZ SINE WAVE
 MASK: B, VHF/UHF 25KHz,
 W/LPF

Morton Flom, P. Eng.

M. Flom

SUPERVISED BY:

NAME OF TEST: 998b0206: 1998-Nov-13 Fri 10:30:00
 STATE: 1: Low Power
 Emission Masks (Occupied Bandwidth)



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

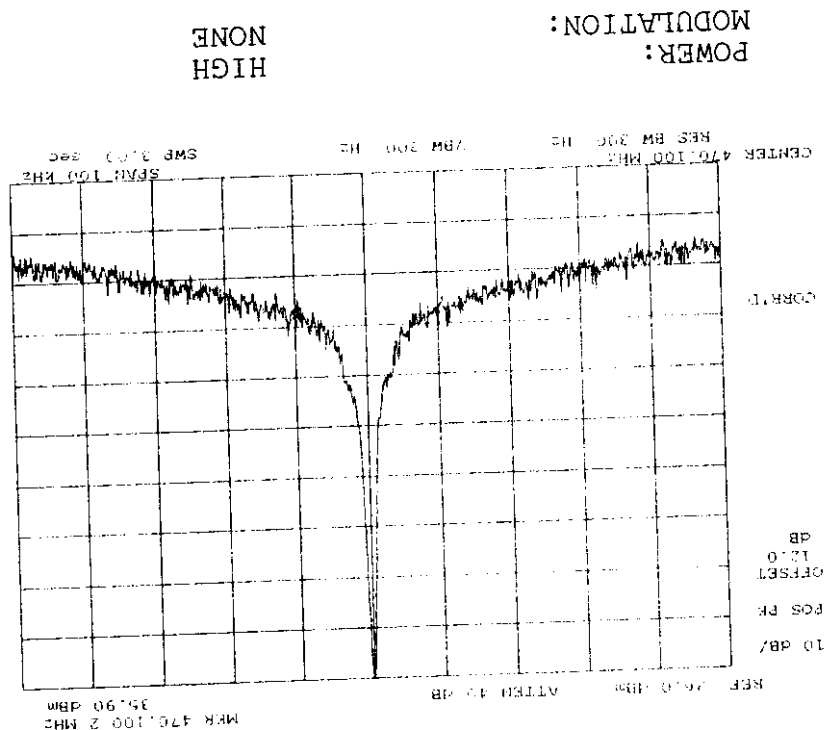
Am. J. Eng.
 Morton Flom, P. Eng.

SUPERVISED BY:

PAGE NO.

19 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
 STATE: 2: High Power
 998b0184: 1998-Nov-13 Fri 10:17:00



POWER: HIGH
 MODULATION: NONE

Morton Flom, P. Eng.

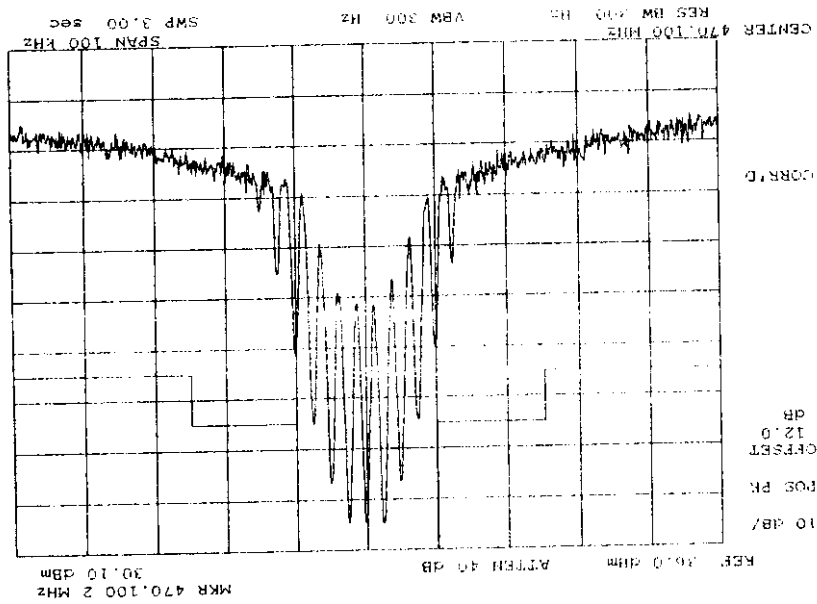
M. Flom

SUPERVISED BY:

PAGE NO.

20 OF 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
 STATE: 2:High Power
 1998-Nov-13 Fri 10:25:00
 g98b0187:



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

Morton Flom, P. Eng.

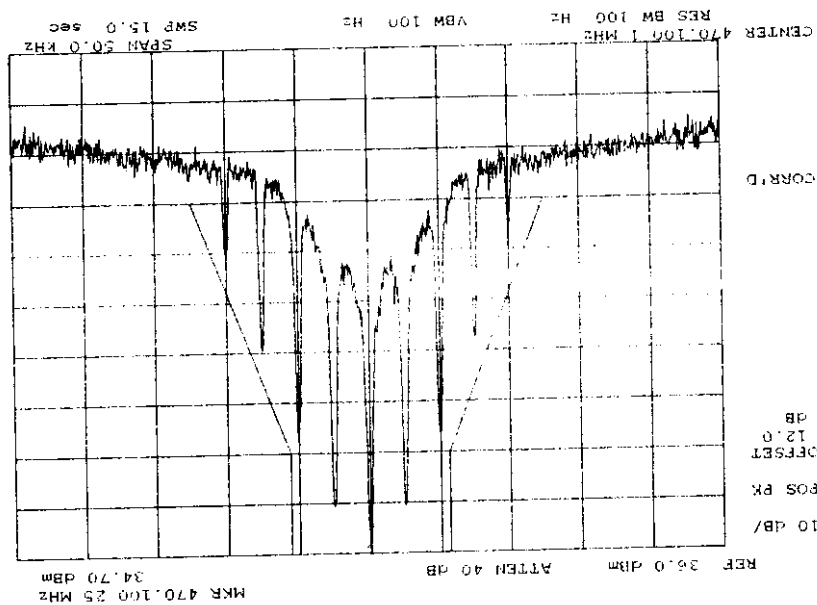
M. Morton Flom

SUPERVISED BY:

PAGE NO.

21 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
 998b0205: 1998-Nov-13 Fri 10:28:00
 STATE: 2: High Power



POWER:
 MODULATION:

HIGH
 VOICE: 2500 HZ SINE WAVE
 MASK: D, VHF/UHF 12.5KHz BW

Morton Flom, P. Eng.

M. Flom

SUPERVISED BY:

Transient Frequency Behavior

47 CFR 90.214

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

As per attached page

MEASUREMENT PROCEDURE

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

2. The transmitter was turned on.

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

4. The transmitter was turned off.

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

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

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

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

LEVELS MEASURED:

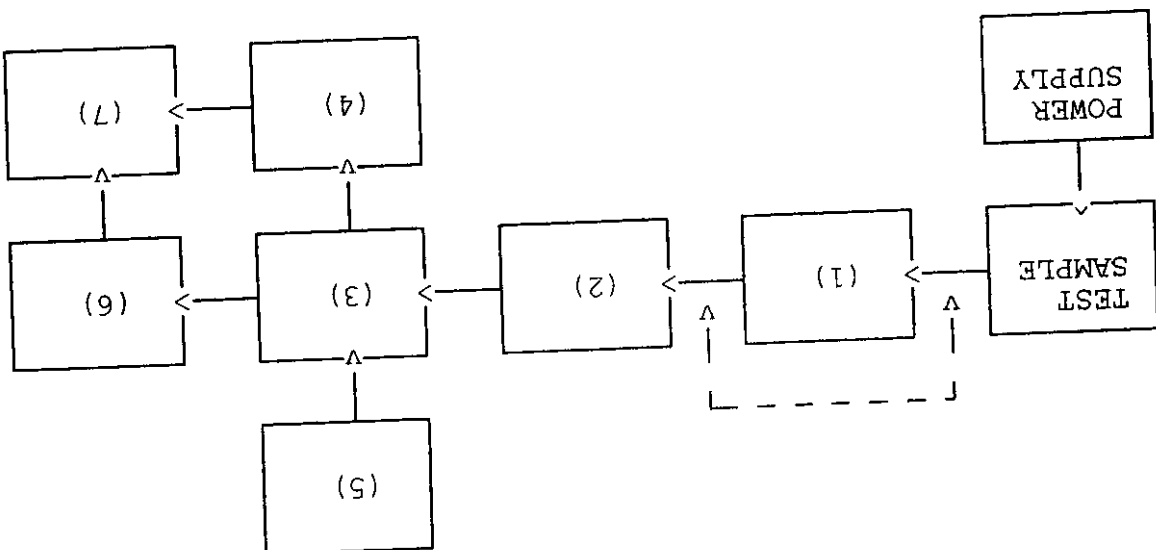
step f, dbm = -16.6
step h, dbm = -36.6
step l, dbm = 14.0

Morton Flom, P. Eng.

M. Flom

SUPERVISED BY:

TRANSIENT FREQUENCY BEHAVIOR



Asset Description s/n

(1) ATTENUATOR (Removed after 1st step)
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
100154 4 x 25 Ω COMBINER
154

(4) CRYSTAL DETECTOR
100159 HP 8470B
1822A10054

(5) RF SIGNAL GENERATOR
100018 HP 8656A
2402A06180
3345U01242

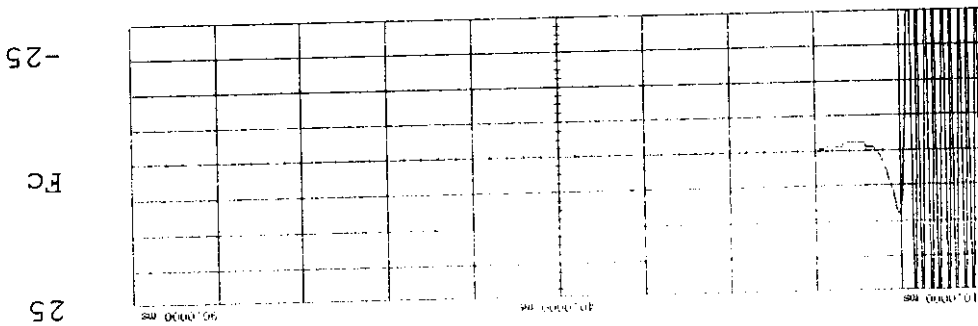
(6) MODULATION ANALYZER
100020 HP 8901A
2105A01087

(7) SCOPE
100030 HP 54502A
2927A00209

PAGE NO.

24 of 43.

NAME OF TEST: Transient Frequency Behavior
STATE: 0:General
998b0194: 1998-Nov-13 Fri 11:00:00



Timebase 10.0 ms/div
Sensitivity 275 mV/div
Offset 0.0000 V
Position 1.0000 V
Coupling AC (1M OHM)
Mode Repetitive
Reference Center
Trigger Mode 1 Edge
On Negative Edge of Chan1
Trigger Level
Channel 1 275 mV/div
Channel 2 275 mV/div
Channel 3 275 mV/div
Channel 4 275 mV/div

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

Morton Flom, P. Eng.

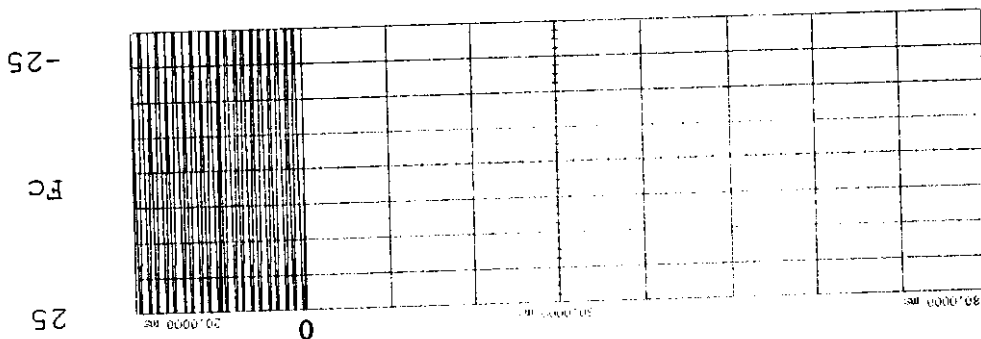
M. Flom

SUPERVISED BY:

PAGE NO.

25 of 43.

NAME OF TEST: Transient Frequency Behavior
 STATE: 0:General
 998b0195: 1998-Nov-13 Fri 11:01:00



Timebase 10.0 ms/div
 Delay/Pos Reference Center
 Mode Repetitive
 Channel 1 275 mV/div
 Offset 0.0000 V
 Coupling AC 1M Ohm
 Trigger Mode 1 Edge
 On Positive Edge of Channel
 Trigger Level
 Channel 1 -600.000 mV (noise reject ON)
 Holdoff 40.000 ms

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

Morton Flom, P. Eng.

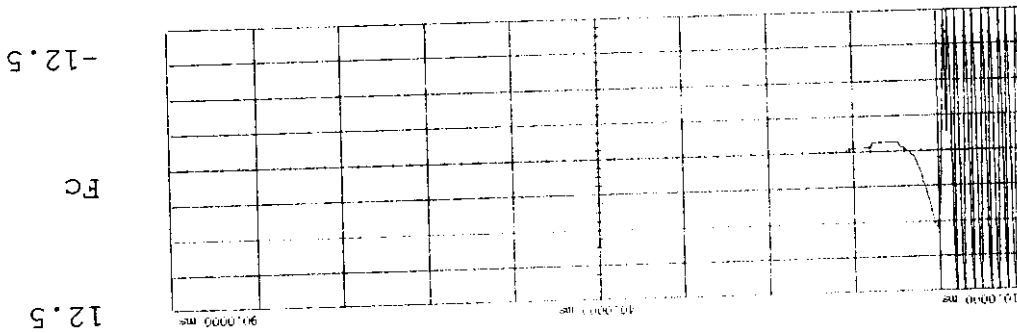
M. Flom

SUPERVISED BY:

PAGE NO.

26 of 43.

NAME OF TEST: Transient Frequency Behavior
 998B0196: 1998-Nov-13 Fri 11:03:00
 STATE: 0:General



Timebase
 Delay/Pos 40.0000 ms
 Reference Center
 Mode Repetitive
 Channel 1 275 mV/div
 Sensitivity 0.0000 V
 Offset 1.0000 V
 Trigger mode: Edge
 On Negative Edge of Channel
 Trigger Level
 Channel = 205.000 mV (Motor Reject 50)
 Holdoff = 40.000 ms

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

Morton Flom, P. Eng.

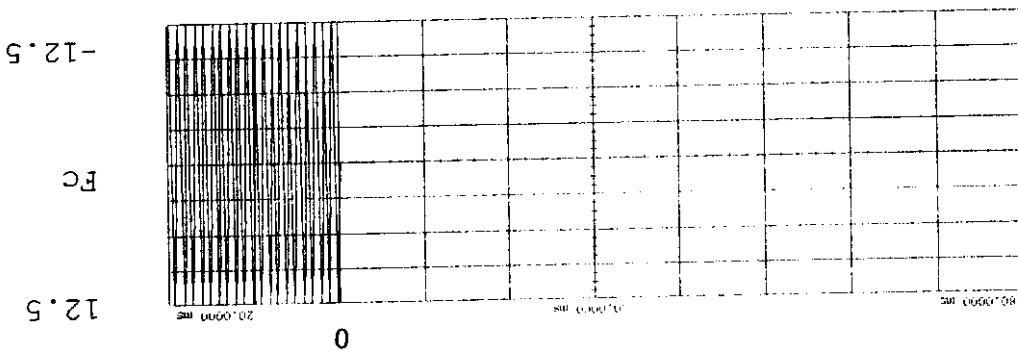
M. Flom

SUPERVISED BY:

PAGE NO.

27 of 43.

NAME OF TEST: Transient Frequency Behavior
 998b0210: 1998-Nov-13 Fri 11:04:00
 STATE: 0:General



Timebase 10.0 ms/div
 Channel 1 275 mV/div
 Offset 0.0000 V
 Filter 10.0000 Hz
 Trigger Mode : Edge
 On Positive Edge of Channel 2
 Trigger Level (mV) 40.0000 mV
 Holdoff 40.0000 ms

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

Morton Flom, P. Eng.

M. Flom P. Eng.

SUPERVISED BY:

28 of 43.

Audio Low Pass Filter (Voice Input)

47 CFR 2.1047(a)

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

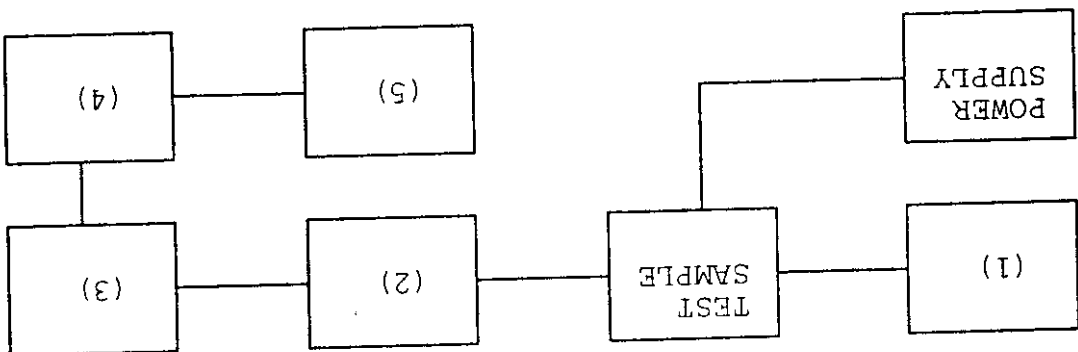
As per attached page

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
 US36002064

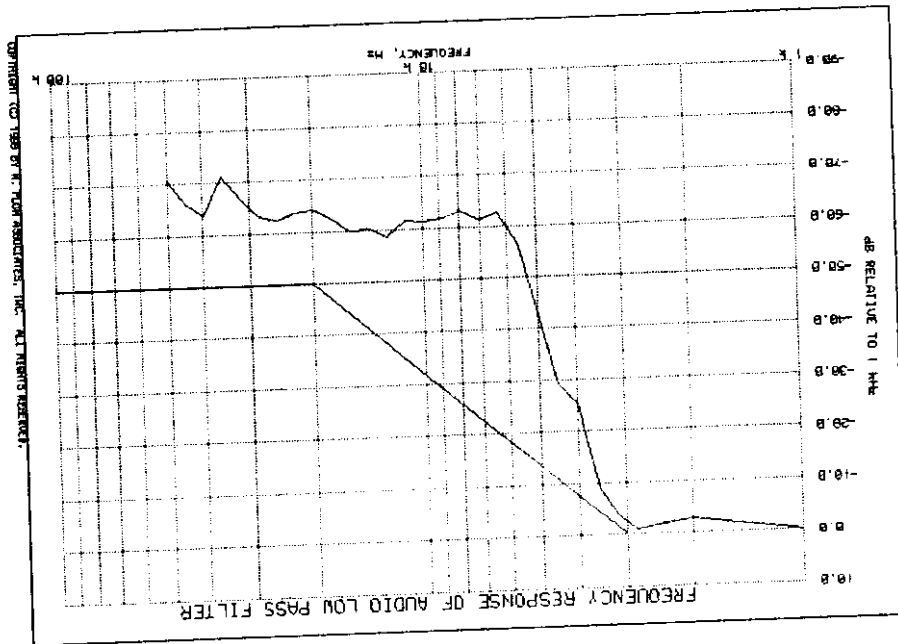
(2) COAXIAL ATTENUATOR
 100122 NARDA 766-10
 100123 NARDA 766-10
 100113 SIERRA 661A-3D
 100069 BIRD 8329 (30 dB)
 10066
 1059
 7802A
 7802

(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)
 STATE: 0:General
 998b0016: 1998-Nov-13 Fri 08:19:00



Morton Flom, P. Eng.

M. Flom

SUPERVISED BY:

PAGE NO. 31 of 43.

NAME OF TEST: Audio Frequency Response

SPECIFICATION: 47 CFR 2.1047(a)

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

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page.

2. The audio signal generator was connected to the audio input circuit/microphone of the EUT.

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

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

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

6. MEASUREMENT RESULTS: ATTACHED

PAGE INTENTIONALLY LEFT BLANK

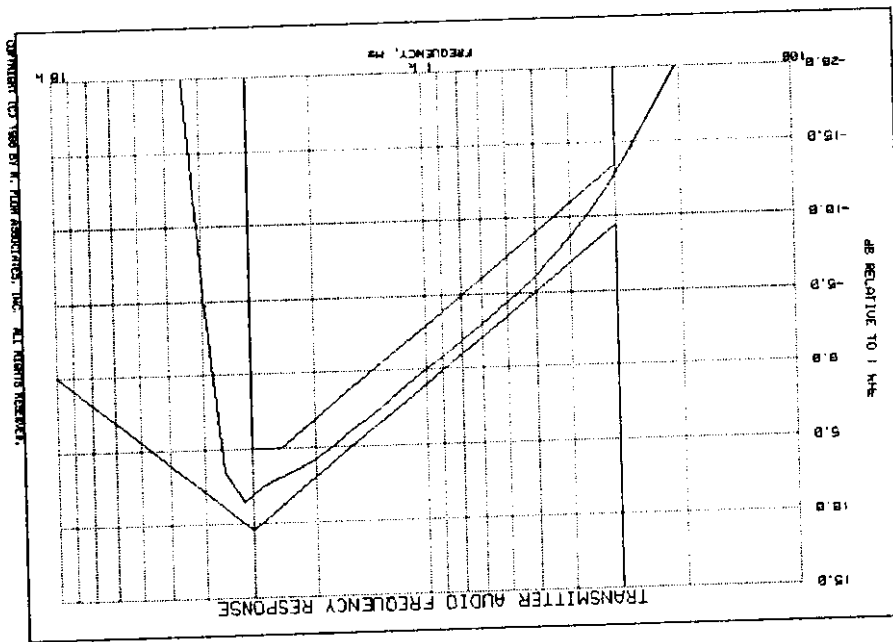
PAGE NO.

32 of 43.

PAGE NO.

33 of 43.

NAME OF TEST: Audio Frequency Response
 998b0015: 1998-Nov-13 Fri 08:16:00
 STATE: 0:General



Additional points:

FREQUENCY, Hz	LEVEL, dB
300	-12.88
20000	-27.68
30000	-27.77
50000	-27.74

Morton Flom, P. Eng.

M. Flom P. Eng.

SUPERVISED BY:

34 of 43.

PAGE NO.

NAME OF TEST:

Modulation Limiting

SPECIFICATION:

47 CFR 2.1047(b)

GUIDE:

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

TEST EQUIPMENT:

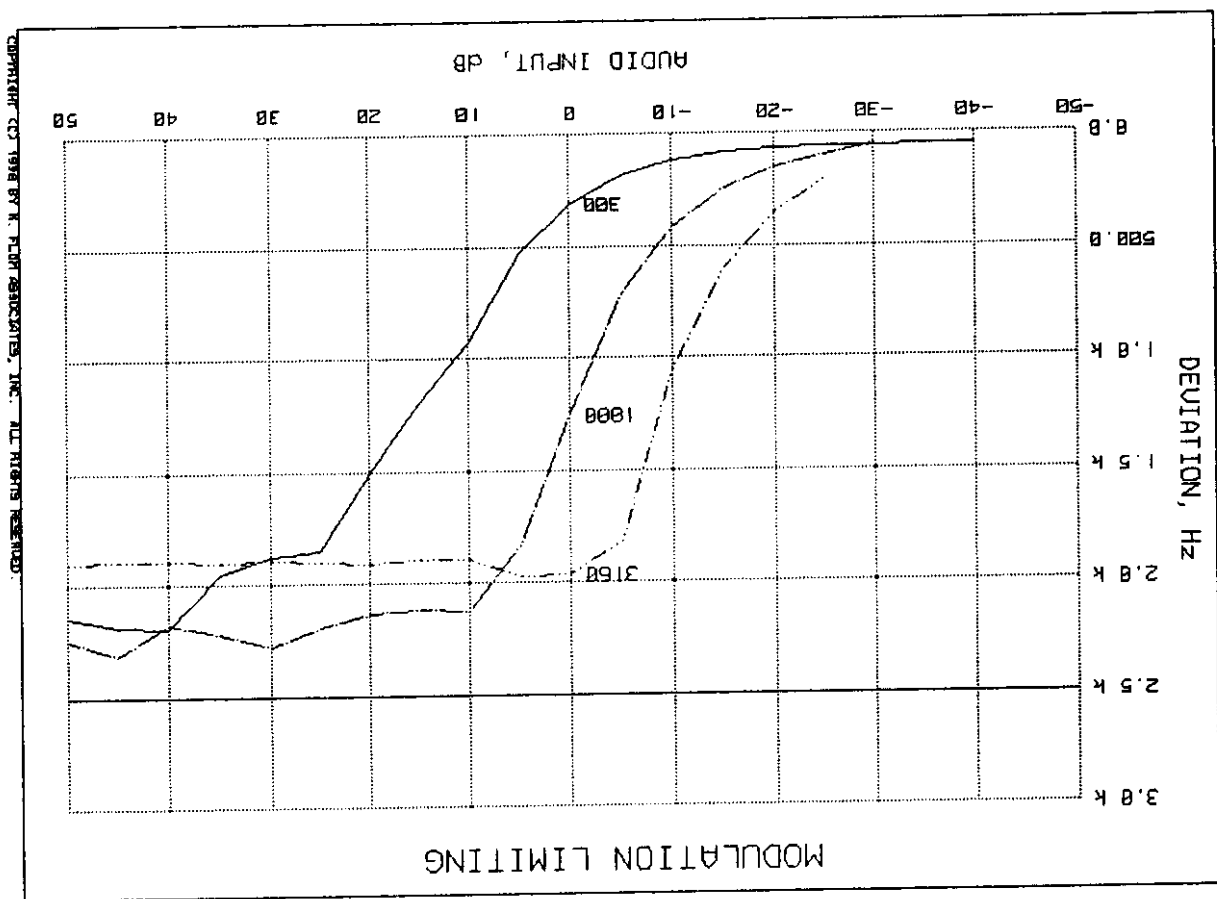
As per previous page

MEASUREMENT PROCEDURE

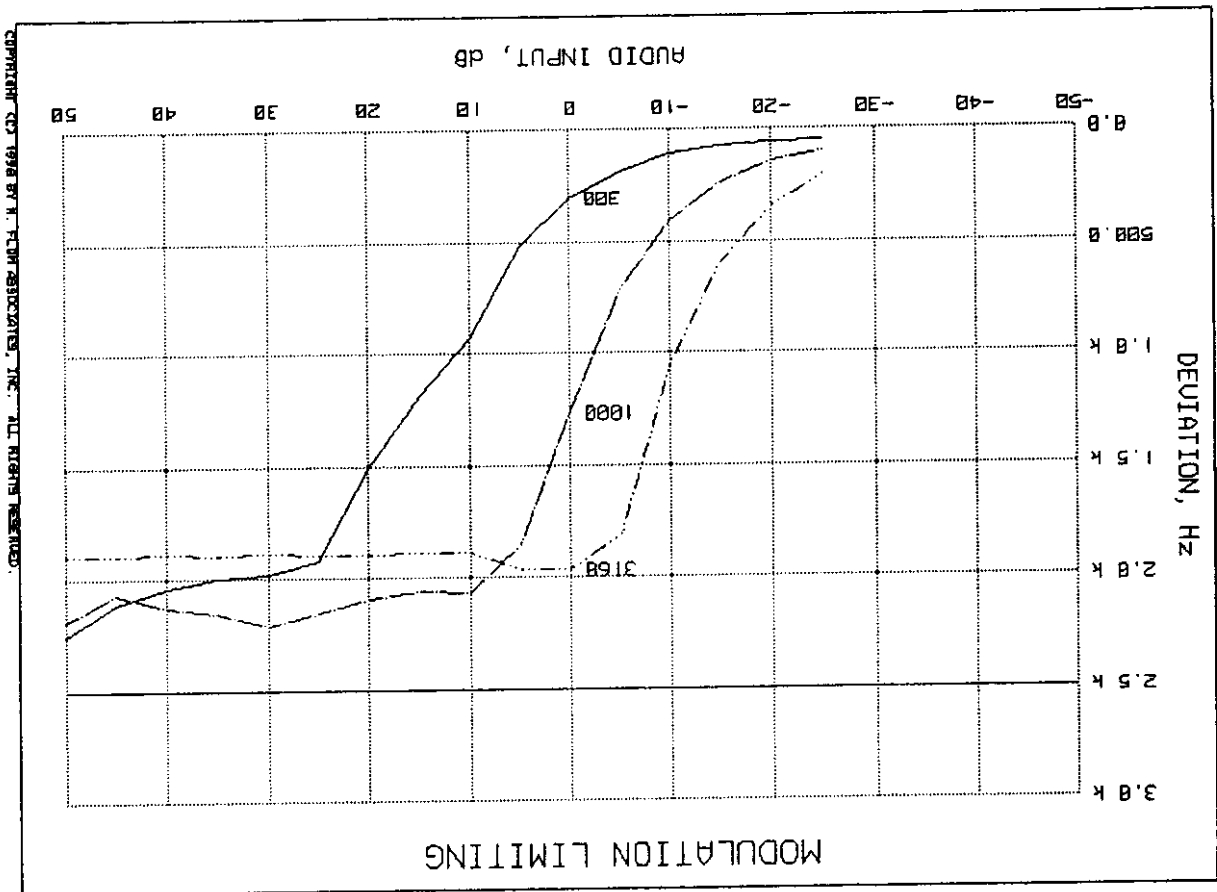
1. The signal generator was connected to the input of the EUT as for "Frequency Response of the Modulating Circuit."
2. The modulation response was measured for each of three frequencies (one of which was the frequency of maximum response), and the input voltage was varied and was observed on an HP 8901A 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

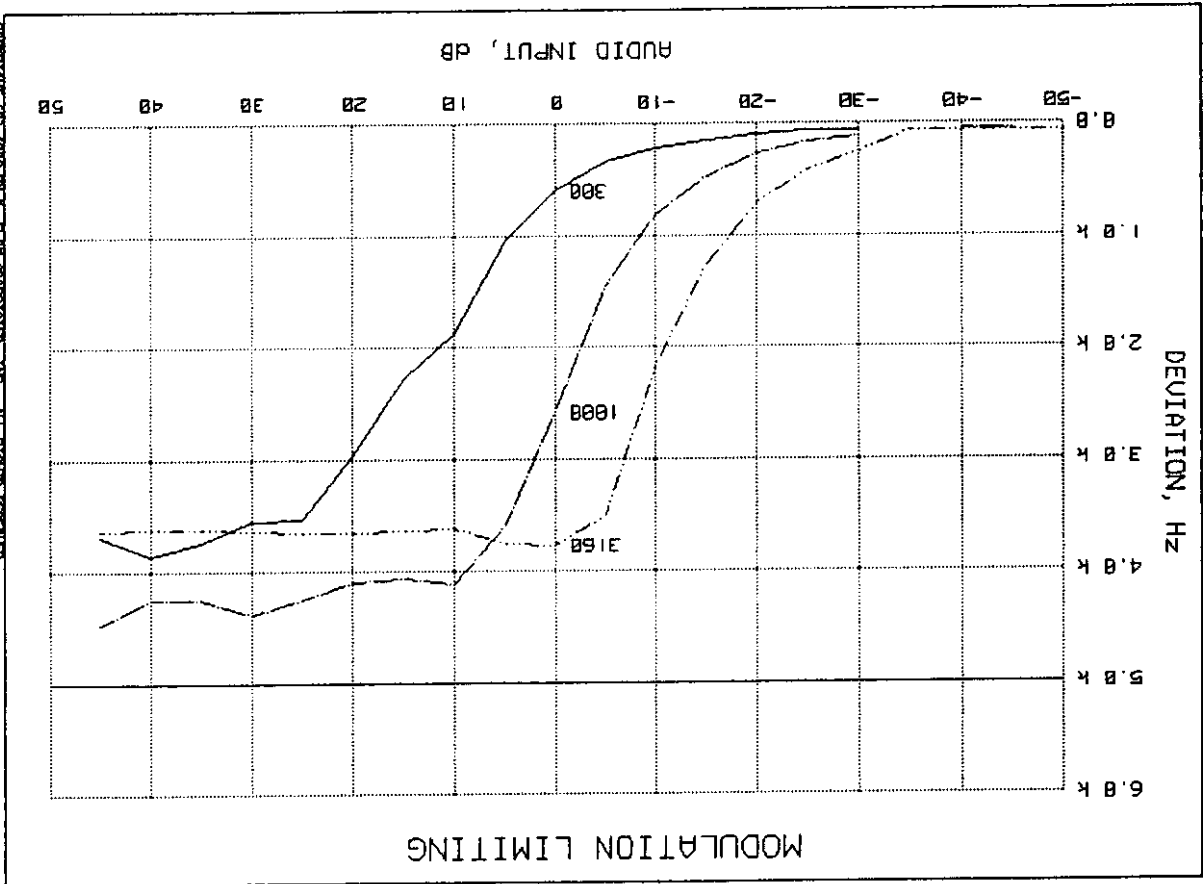
MODULATION LIMITING
KENWOOD, TK-380
1998-NOV-13, 08:28



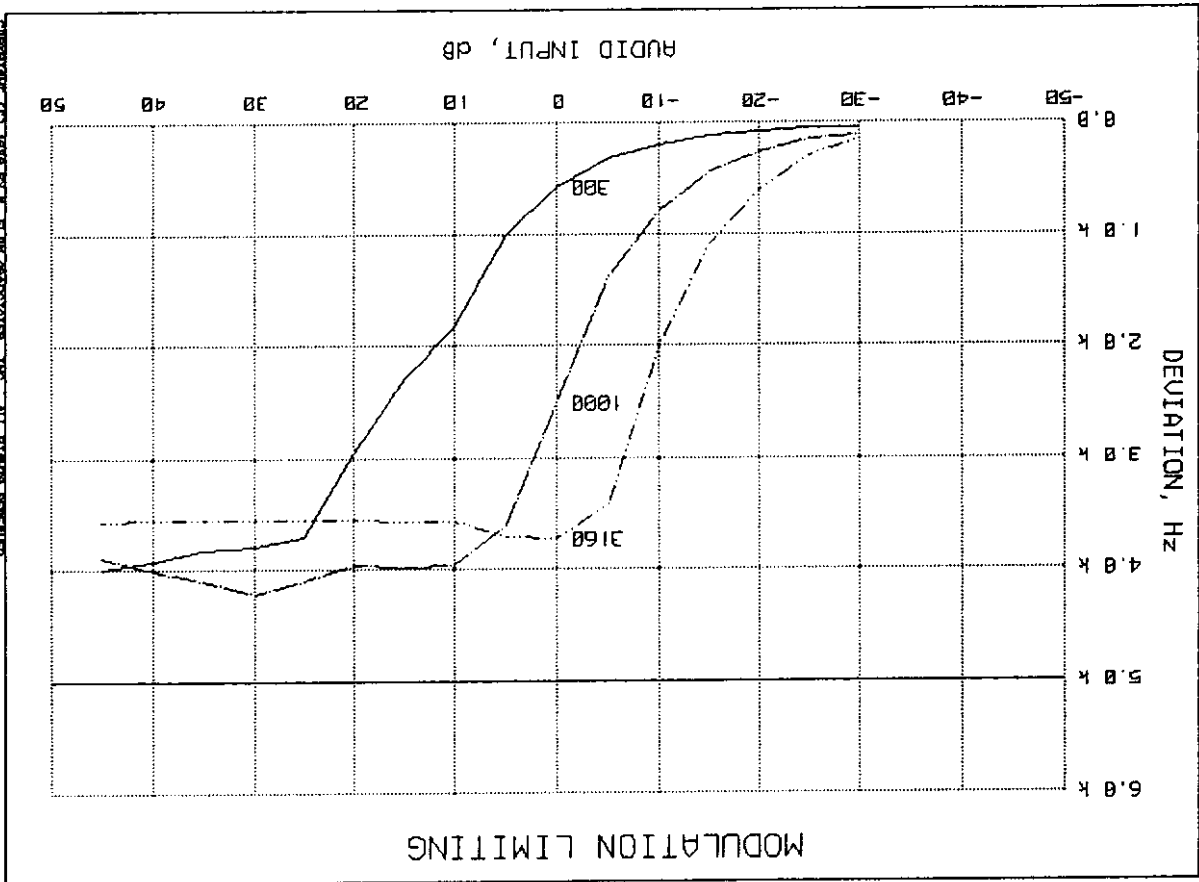
REFERENCE DEVIATION, kHz = 1.25
REFERENCE MODULATION, Hz = 1000
PEAKS = POSITIVE
AUDIO AMPLITUDE, mV = 18.37



REFERENCE DEVIATION, kHz = 1.25
 REFERENCE MODULATION, Hz = 1000
 PEAKS = NEGATIVE
 AUDIO AMPLITUDE, mV = 18.37



REFERENCE DEVIATION, kHz = 2.5
 REFERENCE MODULATION, Hz = 1000
 PEAKS = POSITIVE
 AUDIO AMPLITUDE, mv = 19.68



REFERENCE DEVIATION, kHz = 2.5
 REFERENCE MODULATION, Hz = 1000
 PEAKS = NEGATIVE
 AUDIO AMPLITUDE, mv = 19.01

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.

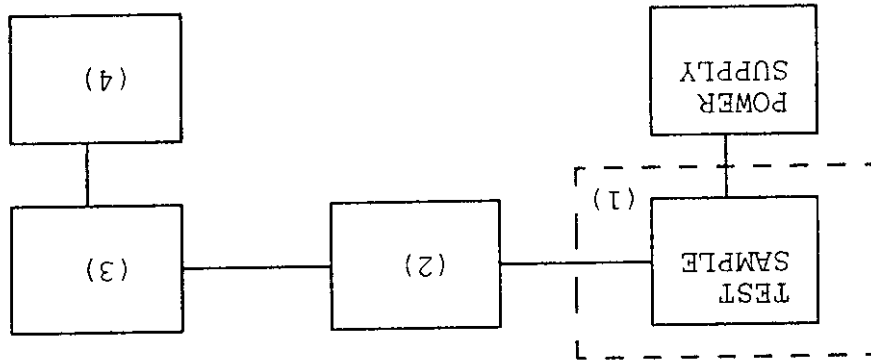
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

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

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

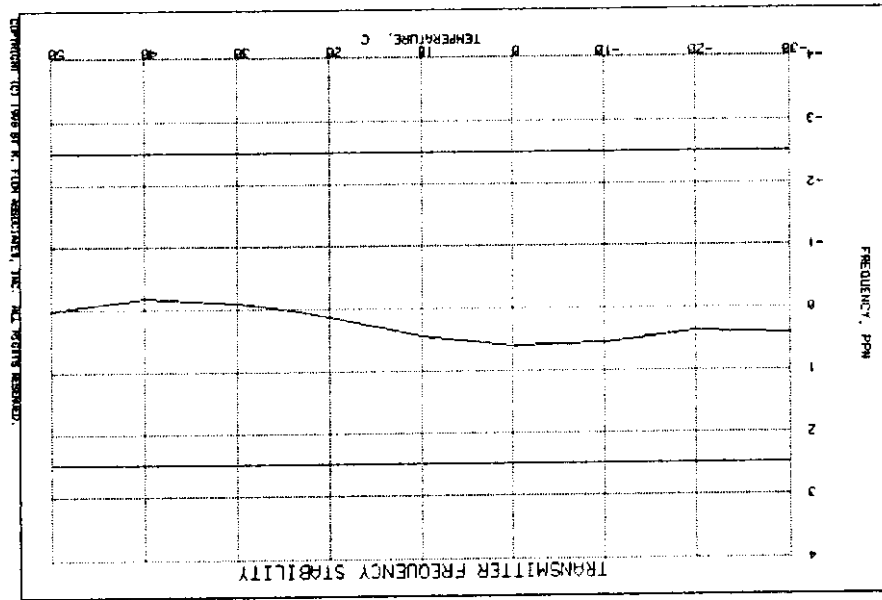
(3)	R.F. POWER	
100014	HP 435A POWER METER	1733A05839
X	100039 HP 436A POWER METER	2709A26776
X	100020 HP 8901A POWER MODE	2105A01087

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

PAGE NO.

41 of 43.

NAME OF TEST: Frequency Stability (Temperature Variation)
g98b0165: 1998-Nov-13 Fri 11:23:00
STATE: 0:General



Morton Flom, P. Eng.

M. Flom

SUPERVISED BY:

42 of 43.

PAGE NO.

Frequency Stability (Voltage Variation)

NAME OF TEST:

47 CFR 2.1055(b) (1)

SPECIFICATION:

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

GUIDE:

As per previous page

TEST EQUIPMENT:

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)

998b0176: 1998-Nov-13 Fri 08:38:15

STATE: 0:General

LIMIT, ppm = 2.5

LIMIT, Hz = 1175

BATTERY END POINT (Voltage) = 6.2

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	6.37	470.099940	-60	-0.13
100	7.5	470.100000	0	0.00
115	8.62	470.100010	10	0.02
83	6.2	470.099830	-170	-0.36

SUPERVISED BY:

Morton Flom, P. Eng.



PAGE NO. 43 of 43.
NAME OF TEST: Necessary Bandwidth and Emission Bandwidth
SPECIFICATION: 47 CFR 2.202(g)

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

MODULATION = 11K0F3E
NECESSARY BANDWIDTH CALCULATION:
 $\frac{\text{MAXIMUM MODULATION (M), KHz}}{\text{MAXIMUM DEVIATION (D), KHz}}$
= 3
= 2.5
= 1
= 11.0
NECESSARY BANDWIDTH (B_N), KHz
= (2 × M) + (2 × D × K)

Am. J. Eng.
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. #4534.
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. 0417204 (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).

Am. J. Eng.
MORTON FLOM, P. Eng.