

SUPERVISED BY:

Morton Flom, P. Eng.



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



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:

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)
4	Rule Summary	2.1033(c) (14)
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  
Report Number: d98b0047

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

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

f) EUT Condition: Report Date: November 18, 1998  
EUT Received: November 11, 1998  
As indicated in individual tests.

h, j, k): No sampling method: In accordance with MFA internal quality manual.  
l) Uncertainty: No sampling procedure used.

Morton Flom, P. Eng.



m) Supervised by: The results presented in this report relate only to the item tested.  
n) Results: This report must not be reproduced, except in full, without written permission from this laboratory.  
o) Reproduction:

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, Variable, N/A

(c) (7) :

MAXIMUM POWER RATING, Watts:

4W FT. 80 / 500W

Subpart 2.1033 (continued)  
(c) (8) : VOLTAGES & CURRENTS 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
- 22 Subpart H - Cellular Radiotelephone Service
- 22.901(d) - Alternative technologies and auxiliary services
- 23 - International Fixed 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 Land Mobile Radio Services
- 94 - Private Operational-Fixed Microwave Service
- 95 Subpart A - General Mobile Radio Service (GMR)
- 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.



SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom*

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

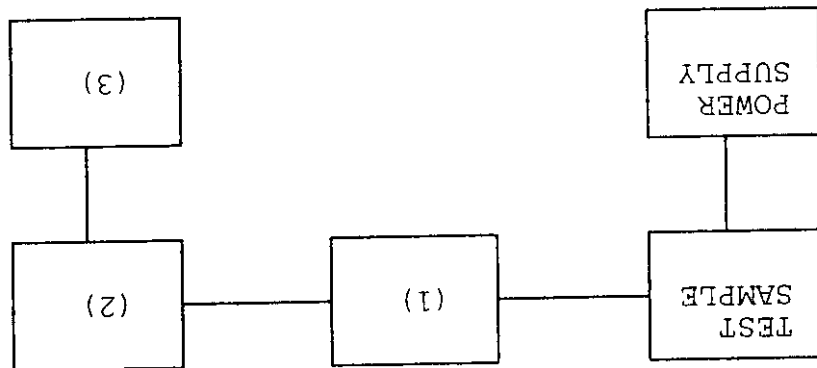
TEST EQUIPMENT: As per attached page

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

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

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

Asset Description s/n



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

TRANSMITTER POWER CONDUCTED MEASUREMENTS

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.

ATTACHED FOR WORST CASE

3. MEASUREMENT RESULTS:

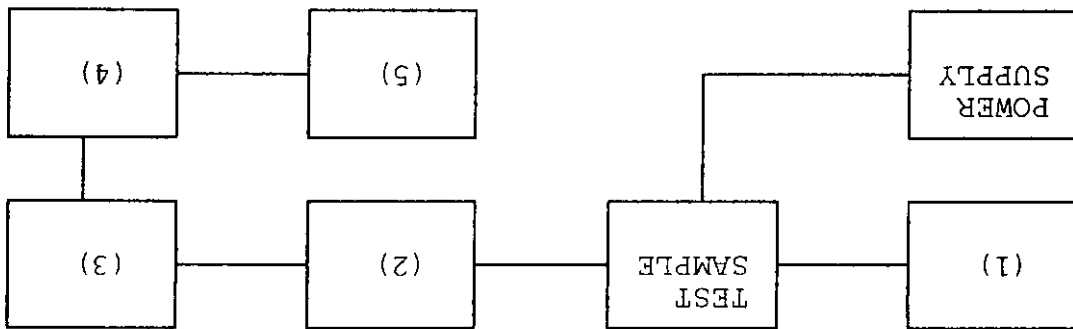
FREQUENCY OF CARRIER, MHZ = 470.1, 450.1, 489.9  
 SPECTRUM SEARCHED, GHZ = 0 to 10 x Fc  
 MAXIMUM RESPONSE, HZ = 3160  
 ALL OTHER EMISSIONS = ≥ 20 DB BELOW LIMIT  
 LIMIT(S), dBc = -43 (1 Watt)  
 = -49 (4 Watts)

Morton Flom, P. Eng.



SUPERVISED BY:

Asset	Description	s/n
(1)	AUDIO OSCILLATOR/GENERATOR	
	100010 HP 204D	1105A04683
	100017 HP 8903A	2216A01753
	100012 HP 3312A	1432A11250
(2)	COAXIAL ATTENUATOR	
	100122 Narda 766-10	7802
	100123 Narda 766-10	7802A
	100069 Bird 8329 (30 dB)	1006
	100113 Sierra 661A-3D	1059
(3)	FILTERS; NOTCH, HP, LP, BP	
	100126 Eagle TNF-1	100-250
	100125 Eagle TNF-1	50-60
	100124 Eagle TNF-1	250-850
(4)	SPECTRUM ANALYZER	
	100048 HP 8566B	2511A01467
	100029 HP 8563E	3213A00104
(5)	SCOPE	
	100058 HP 1741A	2251A09356
	100030 HP 54502A	2927A00209
	100071 Tektronix 935	1935-B011343



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

TRANSMITTER SPURIOUS EMISSION

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	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	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	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

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

g98b0192: 1998-Nov-13 Fri 10:33:00

STATE: 2: High Power

FREQUENCY TUNED, MHZ	FREQUENCY LEVEL, dbm	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

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

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.

4. 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.

5. 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

PAGE NO.

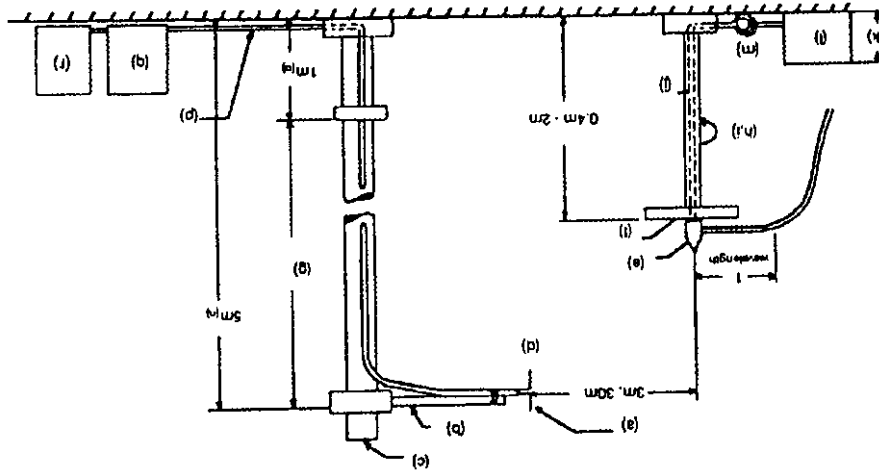
NAME OF TEST:

SPECIFICATION:

GUIDE:

TEST EQUIPMENT:

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 wave length.
  - (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

Asset	Description	s/n	Cycle	Last Cal
100065	EMCO 3109B 100Hz-50MHz	2336	12 mo.	12 mo.
100033	Singer 94593-1 10KHz-32MHz	0219	12 mo.	12 mo.
100088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	12 mo.
100089	Apral 2001 200MHz-1GHz	001500	12 mo.	12 mo.
100103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	12 mo.
100085	EMCO 3116 10GHz-40GHz	2076	12 mo.	12 mo.
100028	AMPLIFIER HP 8449A	2749A00121	12 mo.	Mar-98
100029	SPECTRUM ANALYZER HP 8563E	3213A00104	12 mo.	Dec-97
100033	HP 85462A	3625A00357	12 mo.	Dec-97
100048	HP 8566B	2511AD1467	6 mo.	Mar-98



SUPERVISED BY:

Morton Flom, P. Eng.



2nd to 10th

High <-70

<-75

Low

SPURIOUS LEVEL, dbc

EMISSION, MHZ/HARMONIC

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

NAME OF TEST: Field Strength of Spurious Radiation

PAGE NO. 14 of 43.

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected.
2. For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for  $\pm 2.5$  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

MEASUREMENT PROCEDURE

PAGE NO. 15 of 43.

NAME OF TEST: Emission Masks (Occupied Bandwidth)

SPECIFICATION: 47 CFR 2.1049(c) (1)

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

TEST EQUIPMENT: As per previous page

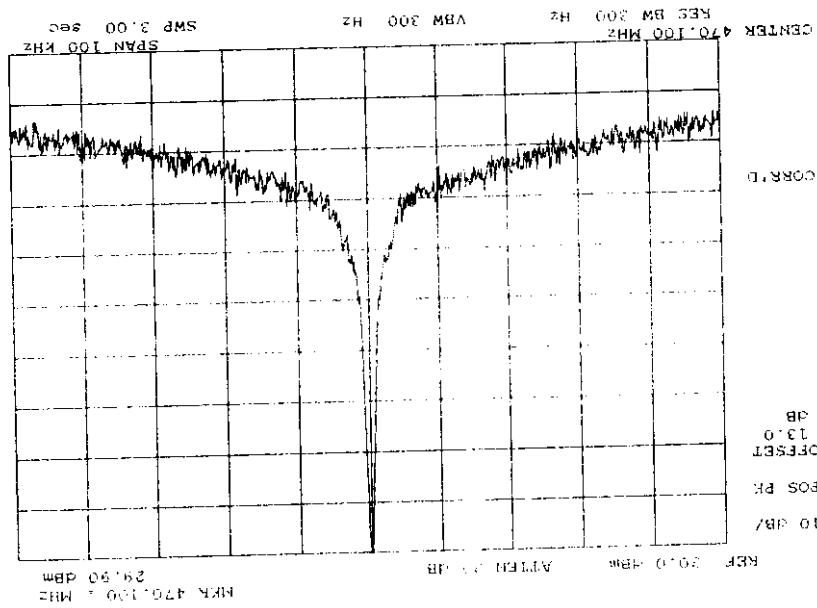
SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom*

MODULATION:  
NONE

POWER:  
LOW



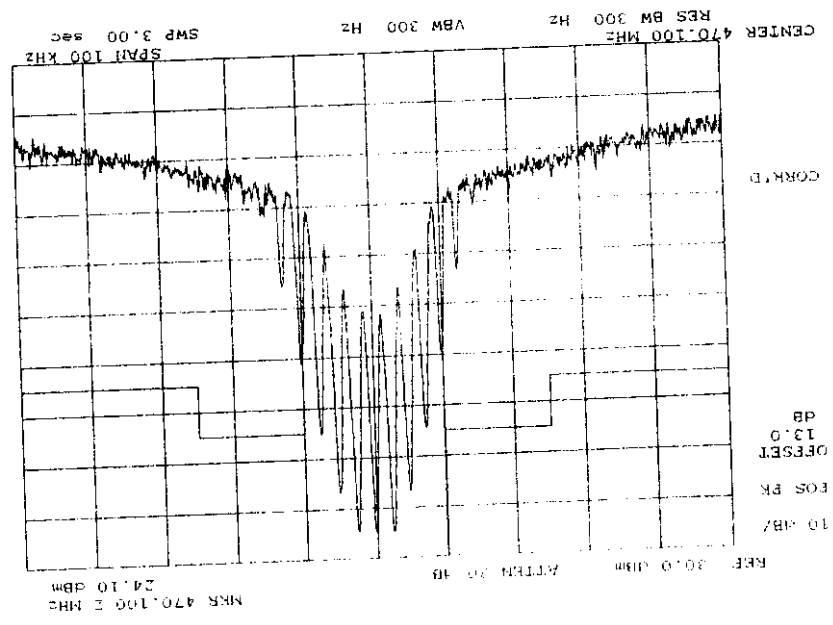
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 STATE: 1: Low Power  
 998B0185: 1998-Nov-13 Fri 10:20:00

SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom*

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



NAME OF TEST: 98b0186: 1998-Nov-13 Fri 10:24:00 STATE: 1: Low Power Emission Masks (Occupied Bandwidth)

PAGE NO.

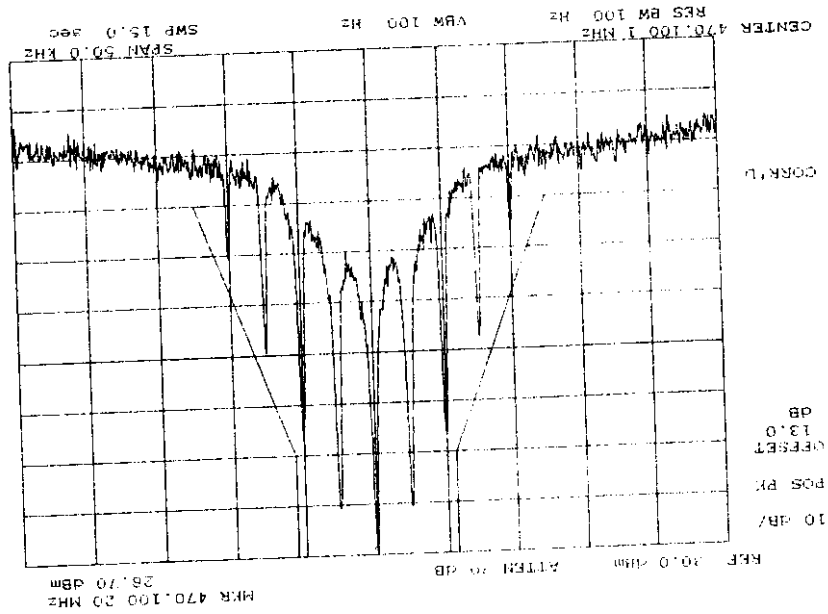
17 of 43.

SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom*

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



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

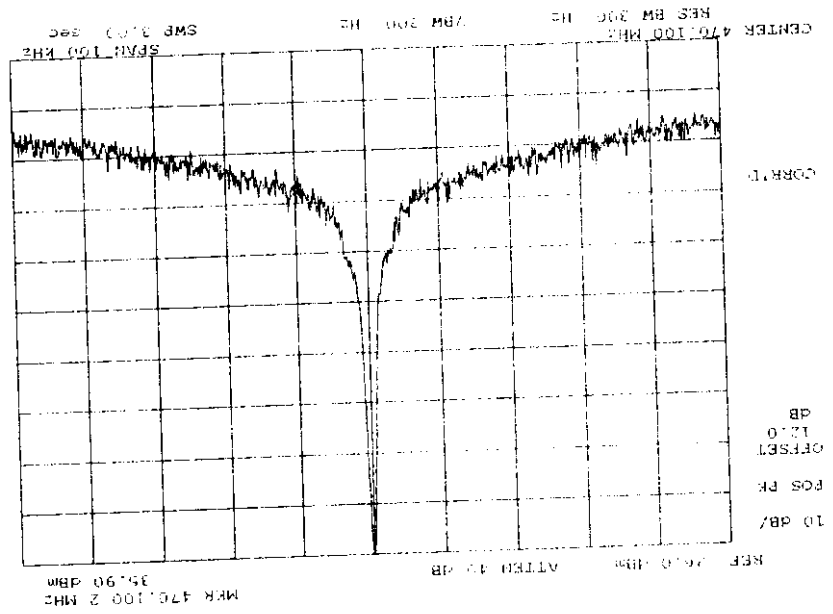
SUPERVISED BY:

Morton Flom, P. Eng.

*Morton Flom*

HIGH  
NONE

POWER:  
MODULATION:



NAME OF TEST: 998B0184: 1998-NOV-13 Fri 10:17:00  
 STATE: 2: High Power  
 Emission Masks (Occupied Bandwidth)

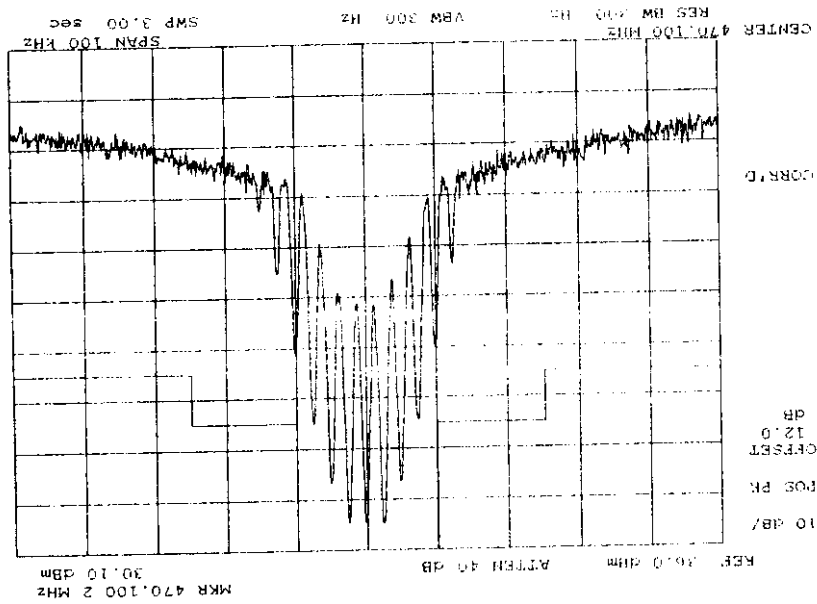
SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom*

HIGH  
VOICE: 2500 HZ SINE WAVE  
MASK: B, VHF/UHF 25KHZ,  
W/LPF

POWER:  
MODULATION:



NAME OF TEST: Emission Masks (Occupied Bandwidth)  
STATE: 2: High Power  
98B0187: 1998-NOV-13 Fri 10:25:00

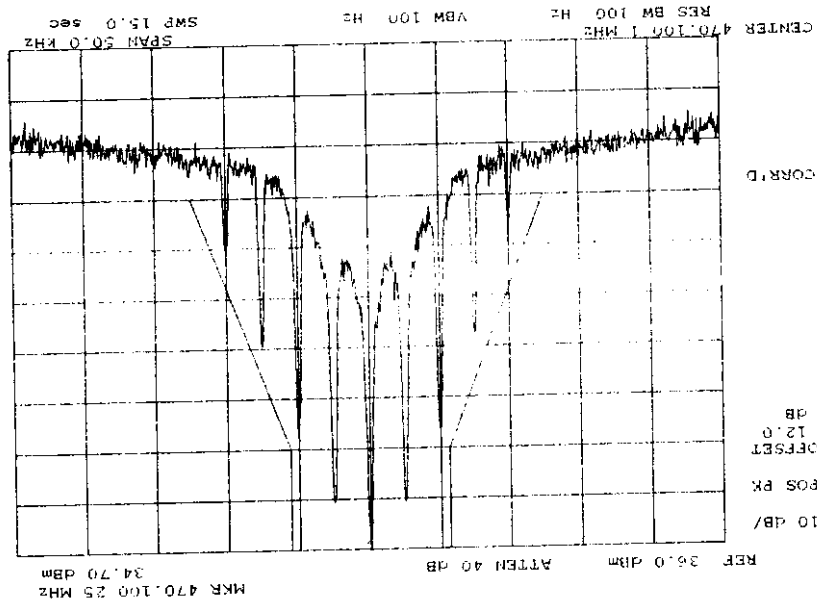
SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom P. Eng.*

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

POWER:  
MODULATION:



NAME OF TEST: Emission Masks (Occupied Bandwidth)  
STATE: 2: High Power  
998B0205: 1998-Nov-13 Fri 10:28:00



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.

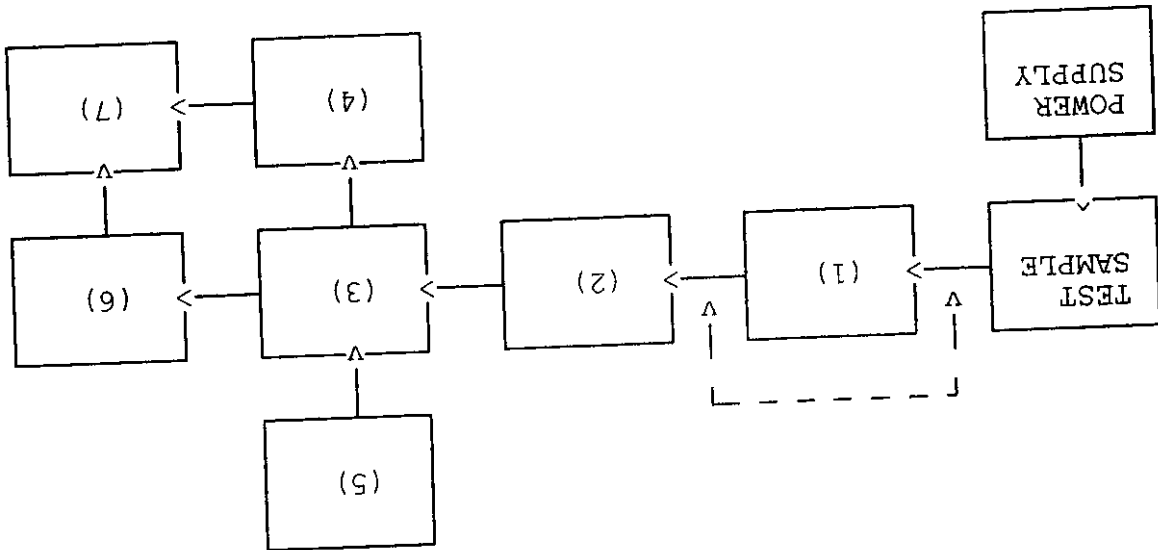
LEVELS MEASURED:

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

Morton Flom, P. Eng.

SUPERVISED BY:

TRANSIENT FREQUENCY BEHAVIOR



Asset Description s/n

(1) ATTENUATOR (Removed after 1st step) 989  
 x 100112 Philco 30 dB

(2) ATTENUATOR  
 100112 Philco 30 dB  
 100172 Bird 30 dB  
 x 100122 Narda 10 dB  
 100123 Narda 10 dB  
 100110 Kay Variable  
 145-387  
 7802A  
 7802  
 989  
 989

(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  
 100031 HP 8656A  
 x 100067 HP 8920A  
 2228A03472  
 2402A06180  
 3345U01242

(6) MODULATION ANALYZER  
 x 100020 HP 8901A  
 2105A01087

(7) SCOPE  
 x 100030 HP 54502A  
 2927A00209

SUPERVISED BY:

Morton Flom, P. Eng.

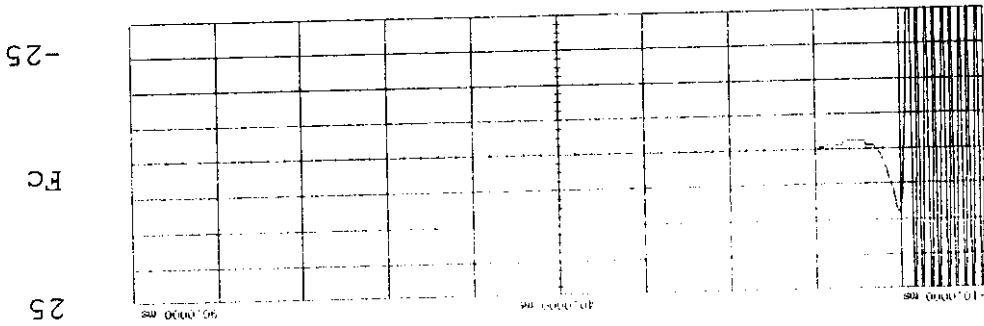
*M. Flom*

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

POWER:  
MODULATION:  
DESCRIPTION:

Channel 1	275 mV/div	Sensitivity	0.0000 V	Probe	100M Ω	DC (1M Ω)	Coupling
Main	10.0 ms/div	Timebase	40.0000 ms	Reference	Center	Repetitive	Mode

Trigger mode: Edge  
On Negative Edge of Ch1  
Trigger level:  
Channel 1 - 25.0000 mV (100% level) 0.0000 mV  
Offset = 40.0000 mV



NAME OF TEST: Transient Frequency Behavior  
98B0194: 1998-Nov-13 Fri 11:00:00  
STATE: 0:General

SUPERVISED BY:

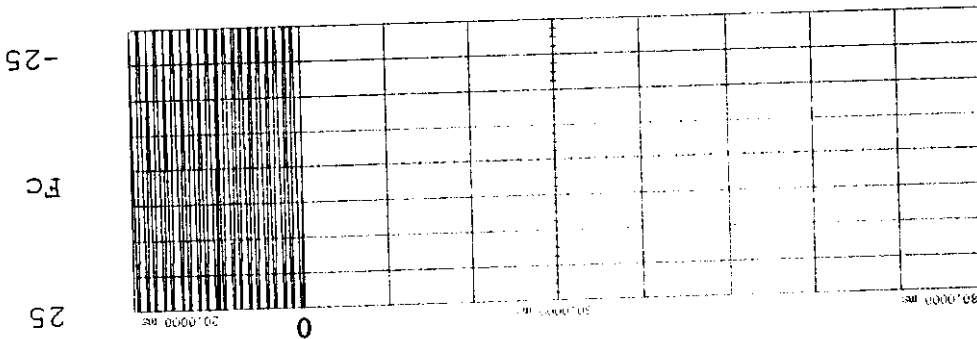
Morton Flom, P. Eng.

*M. Flom*

n/a  
Ref Gen=25 KHz Deviation  
CARRIER OFF TIME

POWER:  
MODULATION:  
DESCRIPTION:

Timebase	Delay/Pos	Reference	Mode
10.0 ms/div	30.0000 ms	Center	Repulsive
Channel 1	Offset	1.0000 V	Coupling
275 mV/div	1.0000 V	1.0000 V	AC (1M Ohm)
Trigger Mode: Edge			
On Positive Edge of Chnl1			
Trigger Level			
Chnl1 = 500.000 mV (noise reject ON)			
Holdsat = 40.000 ms			



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

SUPERVISED BY:

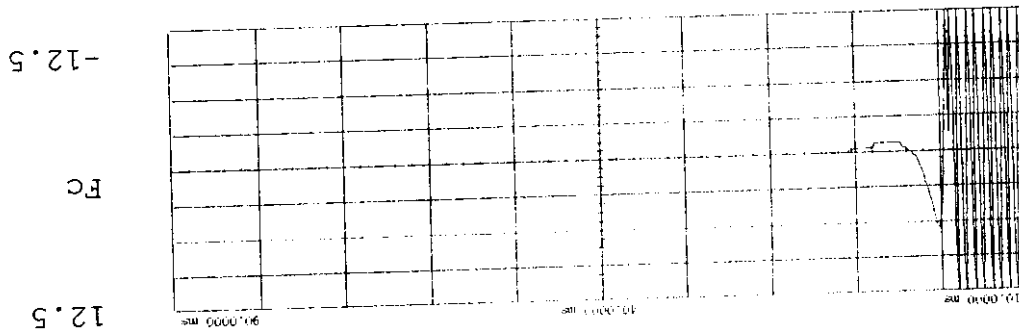
Morton Flom, P. Eng.

*Morton Flom*

n/a  
Ref Gen=12.5 KHz Deviation  
CARRIER ON TIME

POWER:  
MODULATION:  
DESCRIPTION:

Timebase	10.0 ms/div	40.0000 ms	Center	Reference	MODE
Channel 1	275 mV/div	0.0000 V	1.0000 V	Offset	Comp. Int.
					dc (1M Ohm)
					Trigger mode: Edge
					On Negative Edge of (Lead)
					Trigger Level
					Channel = 205.000 mV (Motor reject 5M)
					Holdoff = 40.000 ms



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

PAGE NO.

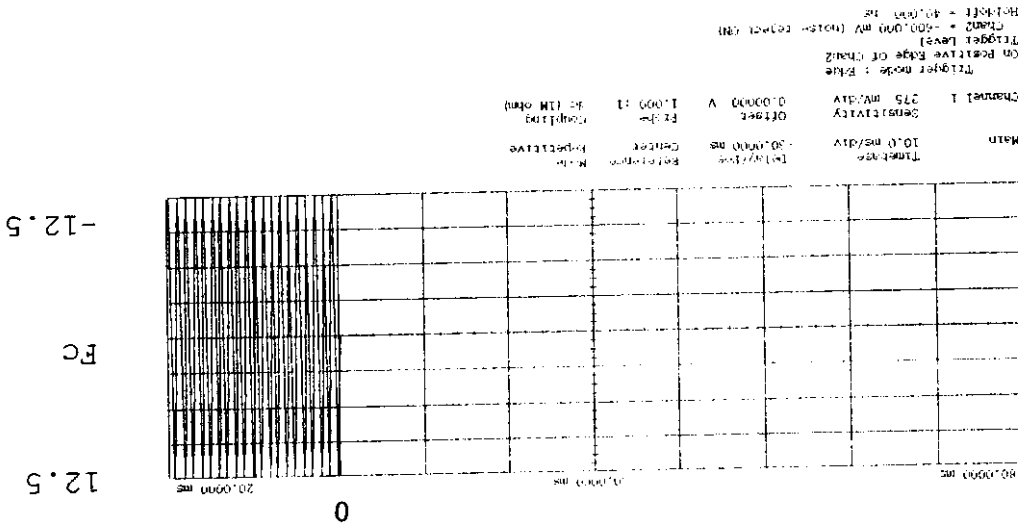
26 of 43.

SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom*

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



NAME OF TEST: Transient Frequency Behavior  
998B0210: 1998-NOV-13 Fri 11:04:00  
STATE: 0:General

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 audio output was connected at the output to the modulated stage.
2. The audio output was connected at the output to the modulated stage.
3. MEASUREMENT RESULTS: ATTACHED

MEASUREMENT PROCEDURE

TEST EQUIPMENT:

As per attached page

GUIDE:

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

SPECIFICATION:

47 CFR 2.1047(a)

NAME OF TEST:

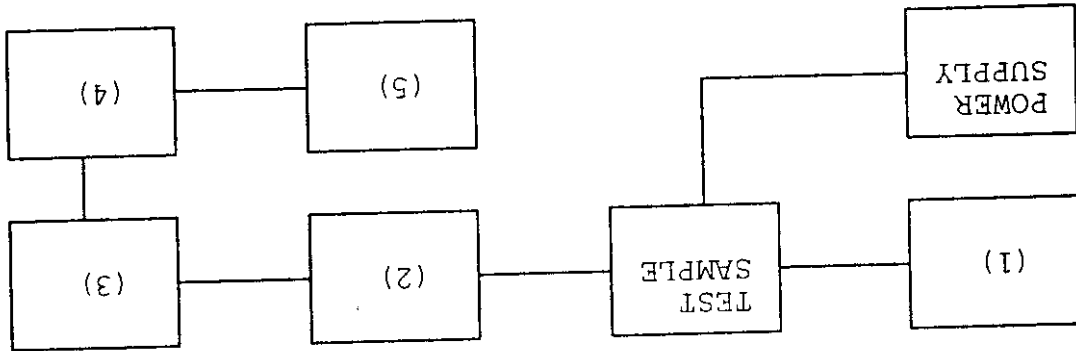
Audio Low Pass Filter (Voice Input)

PAGE NO.

28 of 43.

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  
 10010 HP 204D  
 10017 HP 8903A  
 10018 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

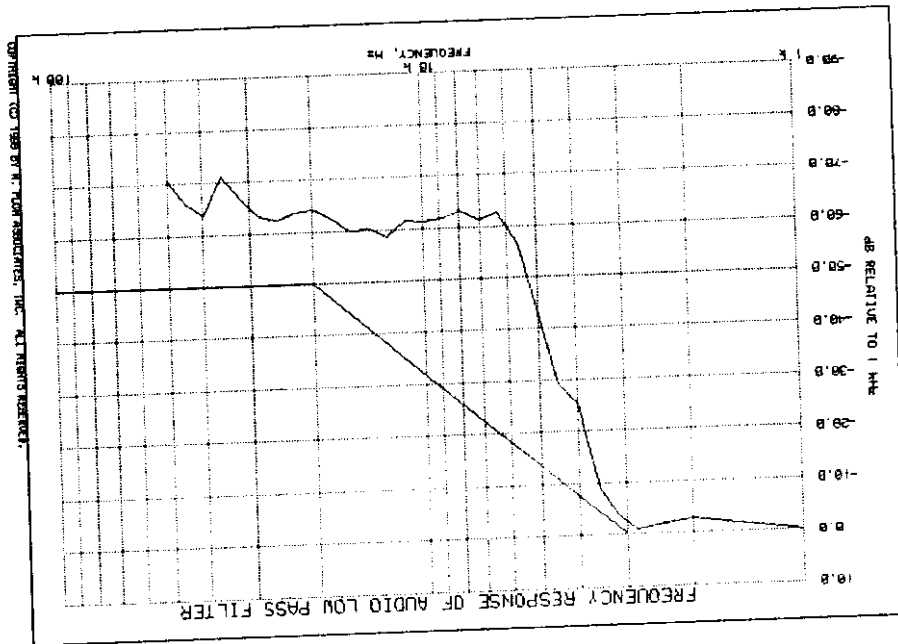
(3) MODULATION ANALYZER  
 100020 HP 8901A  
 2105A01087

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



Morton Flom, P. Eng.

*Morton Flom*

SUPERVISED BY:

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

MEASUREMENT PROCEDURE

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

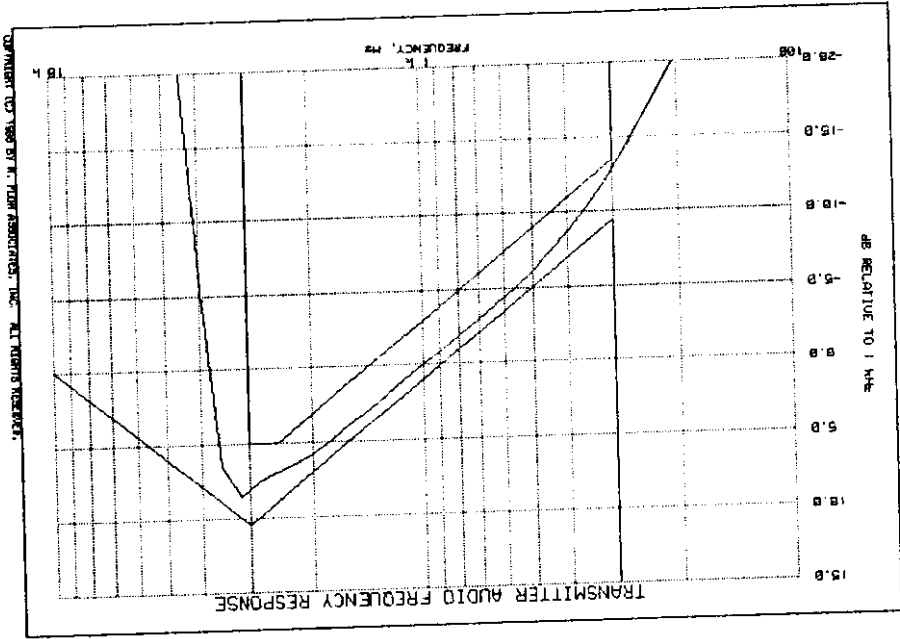
TEST EQUIPMENT: As per previous page

PAGE INTENTIONALLY LEFT BLANK

PAGE NO.

32 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.*  
 Morton Flom, P. Eng.

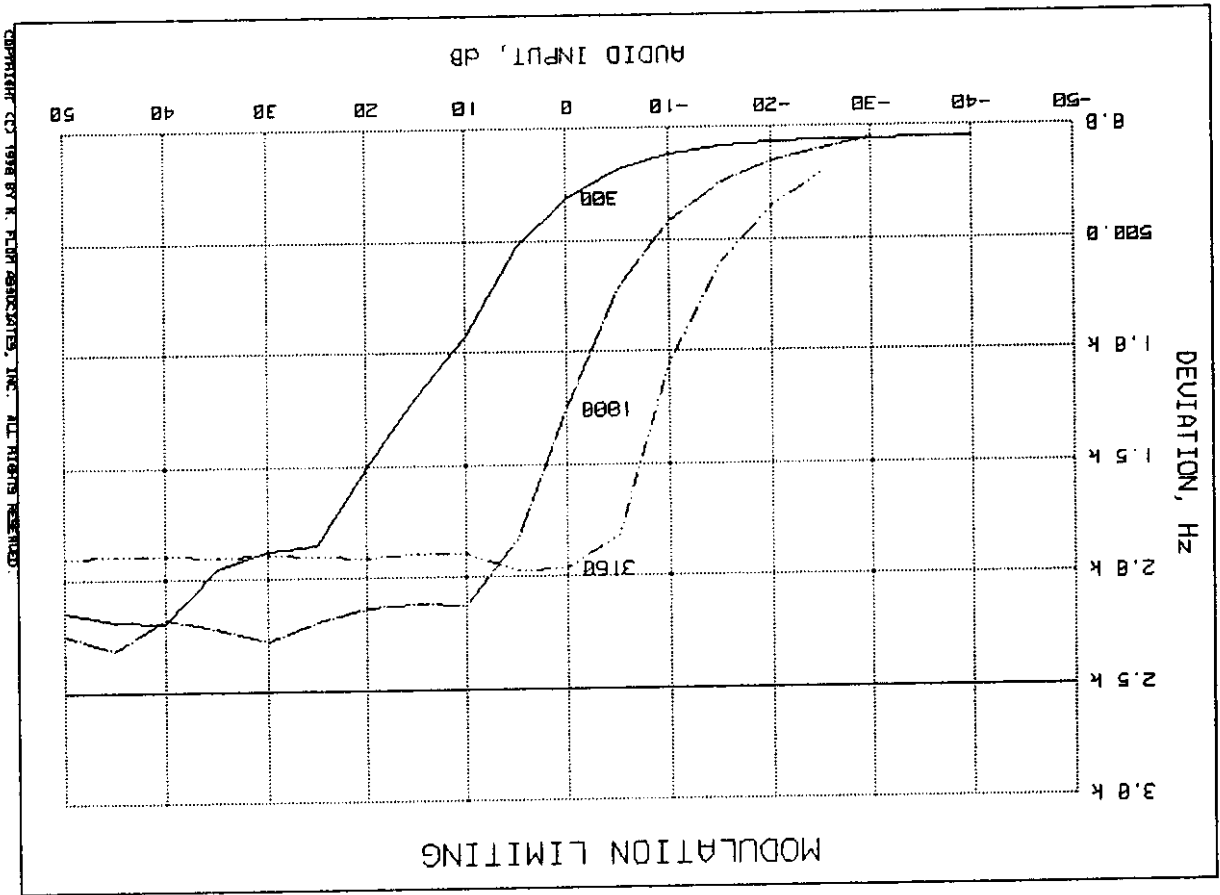
SUPERVISED BY:

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

MEASUREMENT PROCEDURE

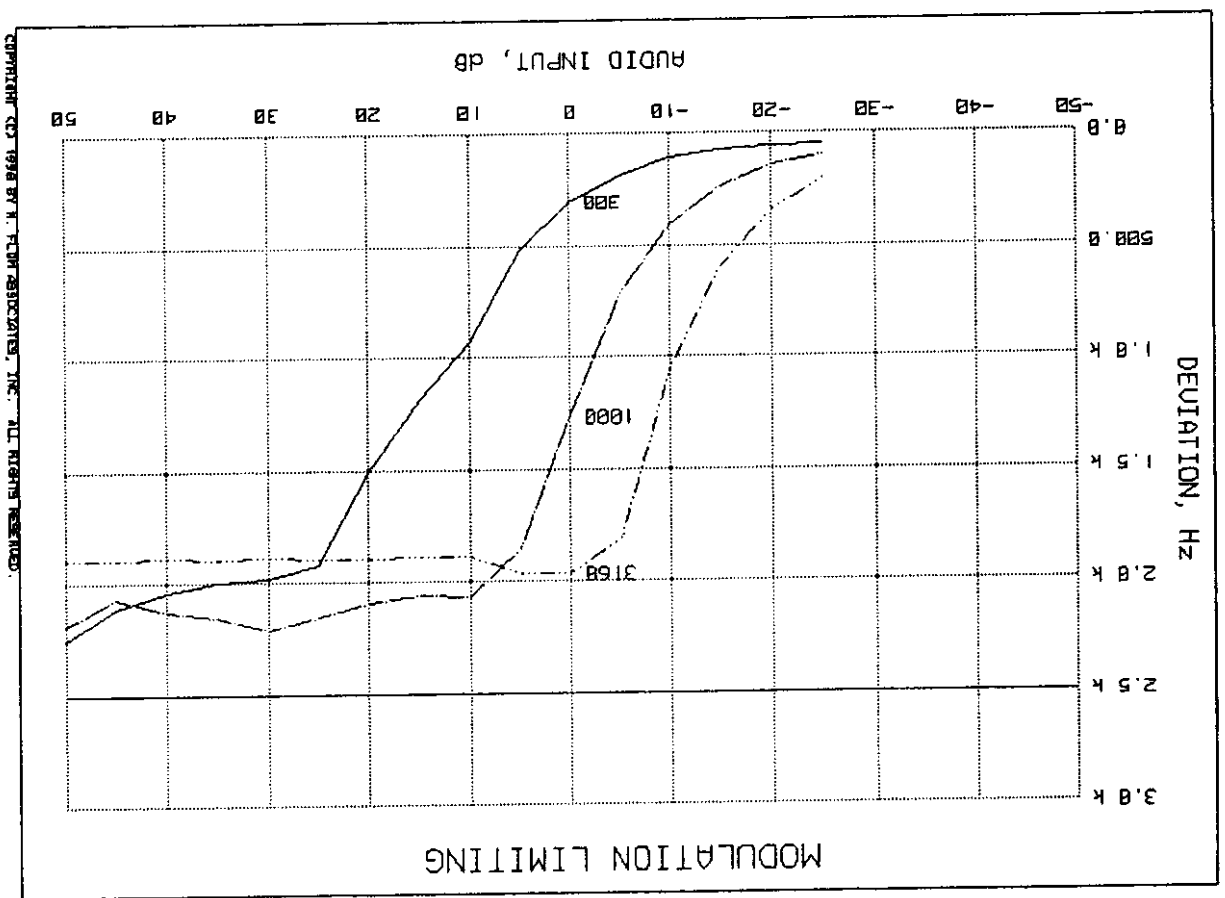
34 of 43.	<u>PAGE NO.</u>
Modulation Limiting	<u>NAME OF TEST:</u>
47 CFR 2.1047(b)	<u>SPECIFICATION:</u>
ANSI/TIA/EIA-603-1992, Paragraph 2.2.3	<u>GUIDE:</u>
As per previous page	<u>TEST EQUIPMENT:</u>

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

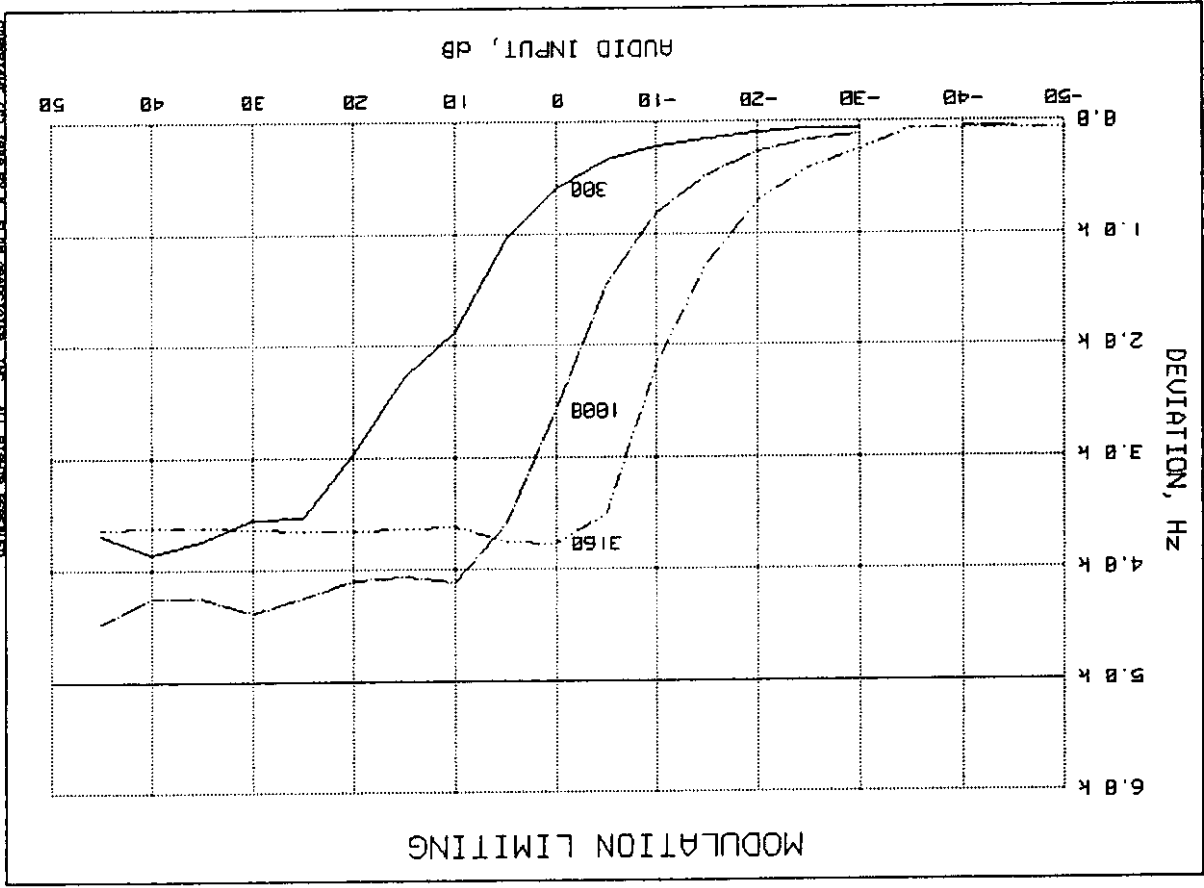
COPYRIGHT © 1998 BY K. LEON ASSOCIATES, INC. ALL RIGHTS RESERVED.



REFERENCE DEVIATION, KHZ = 1.25  
REFERENCE MODULATION, HZ = 1000  
PEAKS = NEGATIVE  
AUDIO AMPLITUDE, MV = 18.37

COPYRIGHT © 1998 BY H. PETER ASSOCIATES, INC. ALL RIGHTS RESERVED.

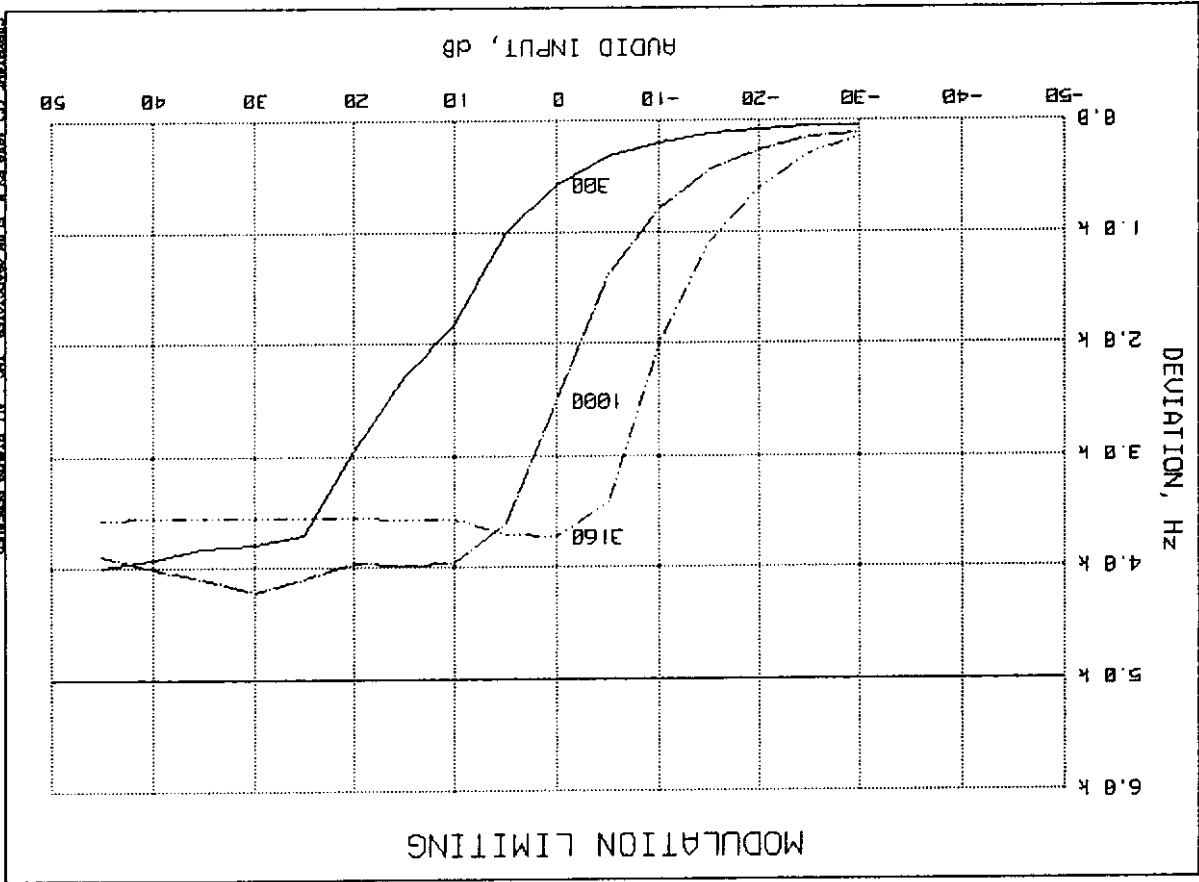
REFERENCE DEVIATION, KHZ = 2.5  
 REFERENCE MODULATION, HZ = 1000  
 PEAKS = POSITIVE  
 AUDIO AMPLITUDE, MV = 19.68



COPYRIGHT © 1998 BY T. FLOTT ASSOCIATES, INC. ALL RIGHTS RESERVED.

MODULATION LIMITING  
 KENWOOD, TK-380  
 1998-NOV-13, 08:23





REFERENCE DEVIATION, KHZ = 2.5  
REFERENCE MODULATION, HZ = 1000  
PEAKS = NEGATIVE  
AUDIO AMPLITUDE, MV = 19.01

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

MEASUREMENT PROCEDURE

PAGE NO. 39 of 43.

NAME OF TEST: Frequency Stability (Temperature Variation)

SPECIFICATION: 47 CFR 2.1055(a) (1)

GUIDE: ANSII/TIA/EIA-603-1992, Paragraph 2.2.2

TEST CONDITIONS: As Indicated

TEST EQUIPMENT: As per previous page

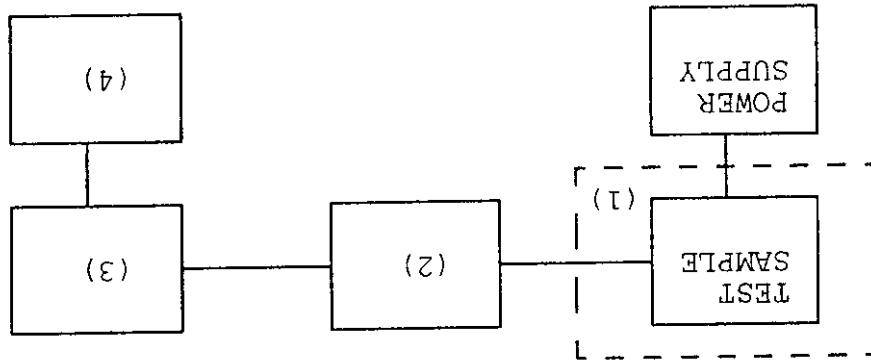
100020	HP 8901A	X
100019	HP 5334B	X
100042	HP 5383A	
(4) FREQUENCY COUNTER		
1628A00959		
2704A00347		
2105A01087		

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

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

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

Asset Description s/n



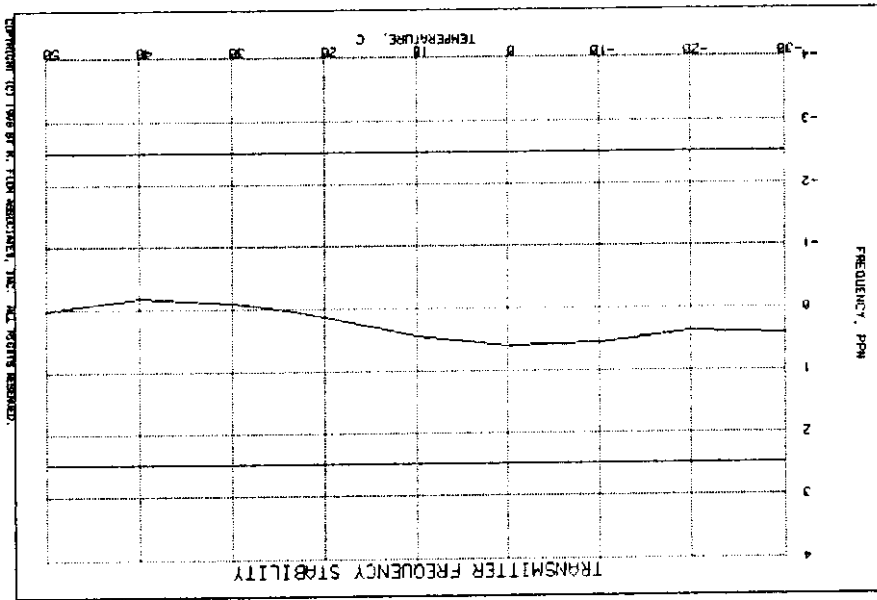
- TEST A. OPERATIONAL STABILITY
- TEST B. CARRIER FREQUENCY STABILITY
- TEST C. OPERATIONAL PERFORMANCE STABILITY
- TEST D. HUMIDITY
- TEST E. VIBRATION
- TEST F. ENVIRONMENTAL TEMPERATURE
- TEST G. FREQUENCY STABILITY: TEMPERATURE VARIATION
- TEST H. FREQUENCY STABILITY: VOLTAGE VARIATION

TRANSMITTER TEST SET-UP

SUPERVISED BY:

Morton Flom, P. Eng.

*M. Flom P. Eng.*



NAME OF TEST: Frequency Stability (Temperature Variation)  
 STATE: 0:General  
 998b0165: 1998-Nov-13 Fri 11:23:00

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 in frequency was measured for the worst case.

RESULTS: g98b0176: 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

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

SUPERVISED BY:

SUPERVISED BY:

Morton Flom, P. Eng.



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

MODULATION = 16K0F3E  
 NECESSARY BANDWIDTH CALCULATION:  
 $\frac{\text{MAXIMUM MODULATION (M), KHZ}}{\text{CONSTANT FACTOR (K)}}$   
 = 3  
 $\frac{\text{MAXIMUM DEVIATION (D), KHZ}}{\text{CONSTANT FACTOR (K)}}$   
 = 5  
 = 1  
 $(2 \times M) + (2 \times D \times K)$   
 = 16.0

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

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:

<p>TESTIMONIAL AND STATEMENT OF CERTIFICATION</p>
---

*M. Morton Flow*

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

EXPERIENCE:

- 5. IEEE, Lifetime Member No. 0417204 (member since 1947). Approvals.
- 4. REGISTERED ENGINEERING CONSULTANT - GOVERNMENT OF CANADA, DEPARTMENT OF COMMUNICATIONS. Radio Equipment Approvals.
- 3. ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOPHYSICISTS & GEOLOGISTS OF ALBERTA #5916.
- 2. ORDER OF ENGINEERS (QUEBEC) 1949. #4534.
- 1. ARIZONA SOCIETY OF PROFESSIONAL ENGINEERS (NSPE), #026 031 821.

PROFESSIONAL AFFILIATIONS:

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

EDUCATION:

STATEMENT OF QUALIFICATIONS