TABLE OF CONTENTS

IN SUPPORT OF THE REQUIREMENTS OF PART 22 (AMPS/TDMA)

IN SUPPORT OF THE REQUIREMENTS OF PART 24 (PCS)

TRANSMITTER CONDUCTED MEASUREMENTS

TRANSMITTER RADIATED MEASUREMENTS

LIST OF GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE

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

22, 24

Sub-part
2.983(a): NAME AND ADDRESS OF APPLICANT:

Nokia Mobile Phones
Elektroniikkatie 10
Fin-90570
Oulu, Finland

VENDOR:

APPLICANT

2.983(b):	FCC ID:	LJPNSW-3ND
	MODEL NO:	6161, Type NSW-3ND
2.983(c):	QUANTITY PRODUCTION PLANNED.	
2.983(d):	TECHNICAL DESCRIPTION:	SEE ATTACHED EXHIBITS
(1):	TYPE OF EMISSION:	40K0F8W, 40K0F1D, 40K0F1E 256KG1D (PCS)
(2):	FREQUENCY RANGE, MHz:	824.02 - 848.98 (AMPS/TDMA) 1850 to 1910 (PCS)
(3):	POWER RATING, Watts:	0.006 to 0.6 (AMPS) 0.001 to 0.6 (TDMA/PCS)
	SWITCHABLE ___ ADJUSTABLE _x_ N/A ___	
(4):	MAXIMUM POWER RATING, Watts:	7 (22.904)

2.983(d)
(5): 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 = 3.9

(6): FUNCTION OF ACTIVE CIRCUIT DEVICES:

PLEASE SEE ATTACHED EXHIBITS

(7): CIRCUIT DIAGRAM:

PLEASE SEE ATTACHED EXHIBITS

(8): MANUAL:

PLEASE SEE ATTACHED EXHIBITS

(9): TUNE-UP PROCEDURE:

PLEASE SEE ATTACHED EXHIBITS

(10): DESCRIPTION OF CIRCUITRY & DEVICES PROVIDED FOR DETERMINING AND STABILIZING FREQUENCY:

PLEASE SEE ATTACHED EXHIBITS

(11): DESCRIPTION OF CIRCUITS OR DEVICES EMPLOYED FOR
(a) SUPPRESSION OF SPURIOUS RADIATION,
(b) LIMITING MODULATION,
(c) LIMITING POWER:

PLEASE SEE ATTACHED EXHIBITS

(12): DIGITAL MODULATION DESCRIPTION:

ATTACHED EXHIBITS ___
N/A x

2.983(e): TEST AND MEASUREMENT DATA:

FOLLOWS

2.983(f): LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

2.983(g): PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

Sub-part
2.983(e): 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 2.981, 2.983, 2.985, 2.987, 2.989, 2.991, 2.993, 2.995, 2.997, 2.999 and the following individual Parts:

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

PLEASE NOTE:

THE EUT IS A DUAL-MODE / DUAL-BAND DEVICE.

THE FOLLOWING PAGES PRESENT THE DATA RECORDED WHILE THE EUT IS OPERATING UNDER PART 22 OF THE RULES.

GENERAL INFORMATION

1. Prior to testing, the deviation for audio modulation and each of the respective SAT + ST tones were set as close to possible to the required limit.

2. Except for audio modulation, which was applied externally, Wideband Data, SAT, ST and all other tones and operational modes were provided by a test control unit incorporating appropriate software. Worst case repetition rate for Wideband Data was 10 kb/s.

3. Spurious radiation was measured at three (3) meters.

4. The two cellular frequency bands are available to the user automatically. Please refer to the manual contained in the documentation.

5. The normal modes of modulation are:

(a)	VOICE	X
(b)	WIDEBAND DATA	X
(c)	SAT	X
(d)	ST	X
(e)	SAT + VOICE	X
(f)	SAT + DTMF	X
(g)	CDMA	___
(h)	TDMA	X
(i)	NAMPS VOICE	___
(j)	NAMPS DSAT	___
(k)	NAMPS ST	___
(l)	NAMPS VOICE + DSAT	___

STANDARD TEST CONDITIONS and ENGINEERING PRACTICES

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

ROOM TEMPERATURE	= 25±5°C
ROOM HUMIDITY	= 20-50%
D.C. SUPPLY VOLTAGE, Vdc	= 3.9
A.C. SUPPLY VOLTAGE, Vac	= N/A
A.C. SUPPLY FREQUENCY, Hz	= N/A

Prior to testing, the E.U.T. 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.

LJPNSW-3ND

NAME OF TEST: R. F. POWER OUTPUT (CONDUCTED)

PARAGRAPH: 47 CFR 2.985 (a)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. 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 RESULTS

NOMINAL, MHz	CHANNEL	R.F. POWER OUTPUT, WATTS Lo	Hi
AMPS MODE:			
824.040	991	0.006	0.6
836.400	380	0.006	0.6
848.970	799	0.006	0.6
CDMA/TDMA/NAMPS MODE:			
825.290		0.001	0.6
836.400		0.001	0.6
847.720		0.001	0.6

SUPERVISED BY:

MORTON FLOM, P. Eng.

NAME OF TEST: R. F. POWER OUTPUT (RADIATED)

PARAGRAPH: 47 CFR 2.985 (a)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT. AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. was placed on an open field site and its radiated field strength at a known distance was measured by means of a spectrum analyzer. Equivalent loading of an isotropic and calculated from the equation $P_t=((E \times R)^2/30)$ watts, where R = 3m.
2. Measurement accuracy is ±1.5 dB.

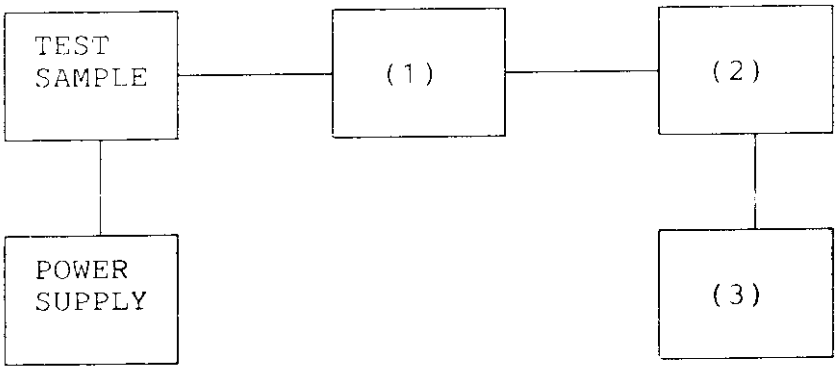
MEASUREMENT RESULTS

NOMINAL, MHz	CHANNEL	R.F. POWER OUTPUT, WATTS Lo	Hi
AMPS MODE:			
824.040	991	0.0068	0.708
836.400	380	0.0068	0.708
848.970	799	0.0068	0.708
CDMA/TDMA/NAMPS MODE:			
825.290		0.0170	0.977
836.400		0.0170	0.977
847.720		0.0170	0.977

SUPERVISED BY: MORTON FLOM, P. Eng.

R.F. POWER OUTPUT (A.M. OR F.M.)

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



(1) COAXIAL ATTENUATOR

NARDA 766-10	x
SIERRA 661A-30	
BIRD 8329 (30 dB)	

(2) POWER METERS

HP 435A	
HP 436A	x
HP 8901A	x

(3) FREQUENCY COUNTER

HP 5383A	
HP 5334B	x
HP 8901A FREQUENCY MODE	x

NAME OF TEST: MODULATION CHARACTERISTICS - FREQUENCY RESPONSE OF AUDIO MODULATING CIRCUIT

PARAGRAPH: 47 CFR 2.987 (a)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. 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 E.U.T.

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.

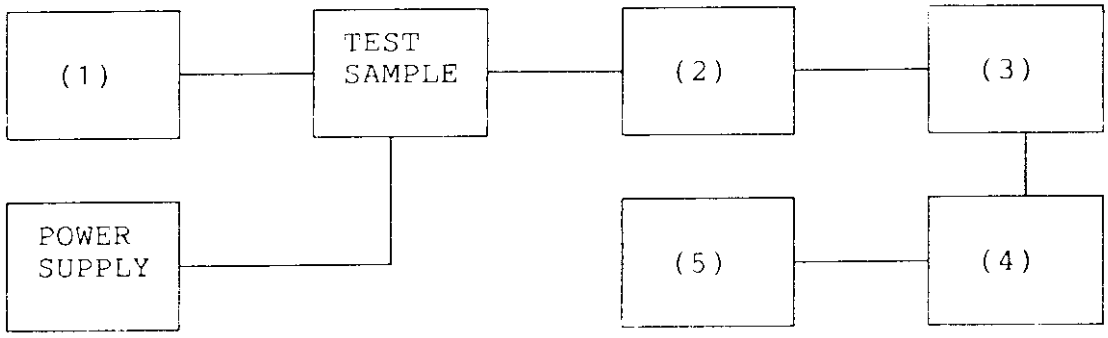
4. With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 100 Hz to 50 kHz.

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

6. MEASUREMENT RESULTS: ATTACHED

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



(1) AUDIO OSCILLATOR/GENERATOR

HP 204D	___
HP 8903A	x
_____	___

(2) COAXIAL ATTENUATOR

NARDA 766-10	___
SIERRA 661A-30	x
BIRD 8329 (30 dB)	___
_____	___

(3) MODULATION ANALYZER

HP 8901A	x
_____	___

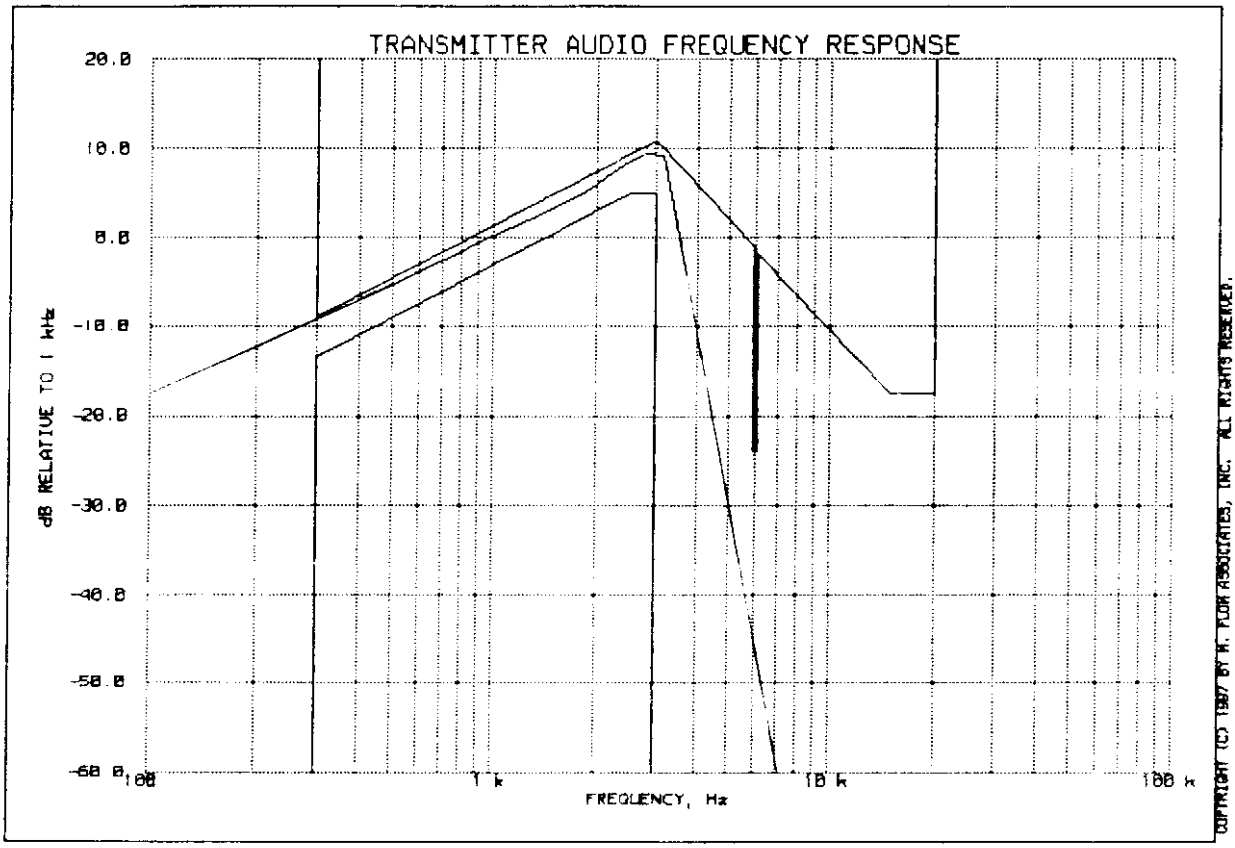
(4) AUDIO ANALYZER

HP 8903A	x
_____	___

(5) SCOPE

HP 54502A	___
_____	___

TRANSMITTER AUDIO FREQUENCY RESPONSE
NOKIA, 6160
17 NOV 1997, 12:06



PEAK AUDIO FREQUENCY, Hz: 2820

TABLE VALUES:

FREQUENCY, Hz	LEVEL, dB	FREQUENCY, Hz	LEVEL, dB	FREQUENCY, Hz	LEVEL, dB
300	-9.5	30000	-18.2		
20000	-18.2	50000	-18.4		

SUPERVISED BY: MORTON FLOM, P. Eng.

NAME OF TEST: MODULATION CHARACTERISTICS – FREQUENCY RESPONSE OF AUDIO LOW PASS FILTER

PARAGRAPH: 47 CFR 2.987 (a)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER PREVIOUS PAGE

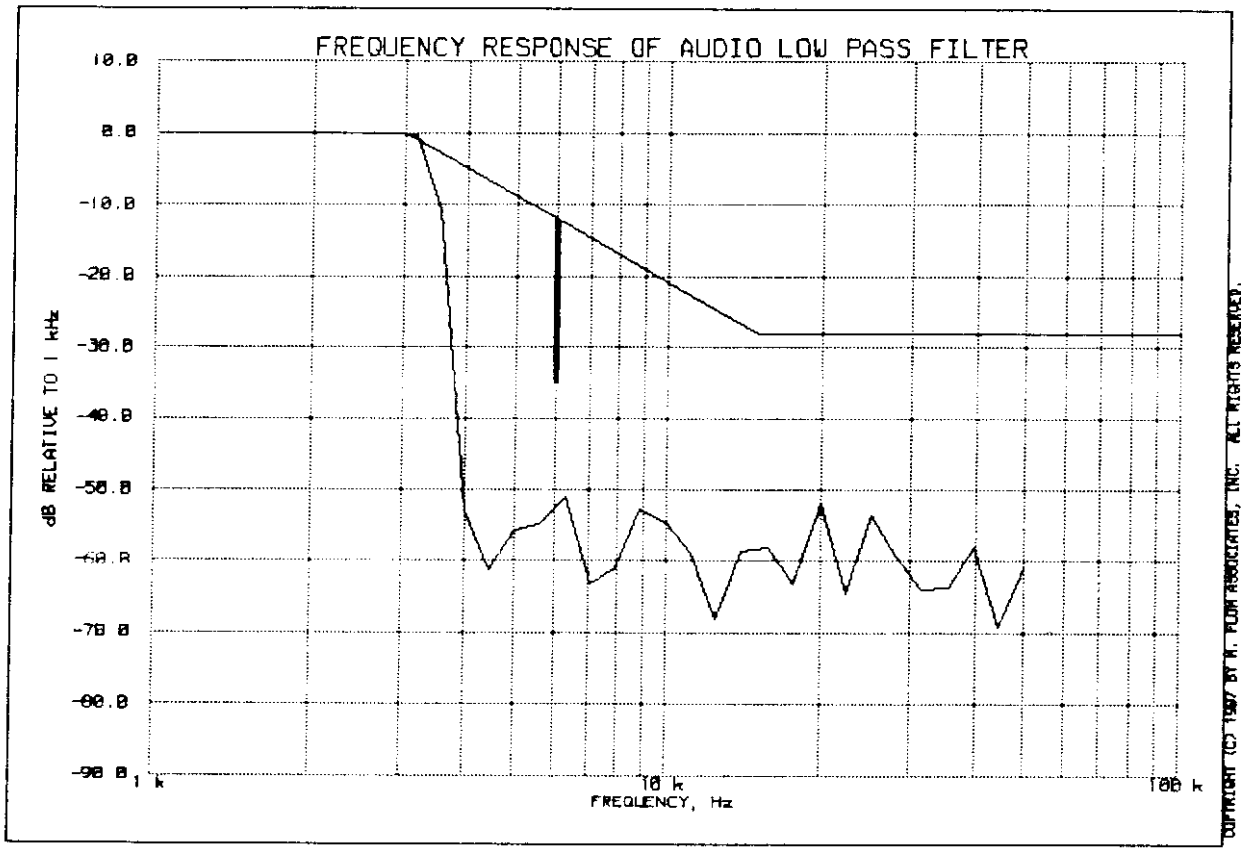
MEASUREMENT PROCEDURE

1. The E.U.T. 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

FREQUENCY RESPONSE OF AUDIO LOW PASS FILTER
NOKIA, 6160
17 NOV 1997, 12:45



PEAK AUDIO FREQUENCY, Hz: 2820

SUPERVISED BY:

MORTON FLOM, P. Eng.

NAME OF TEST: MODULATION CHARACTERISTICS - MODULATION LIMITING

PARAGRAPH: 47 CFR 2.987 (b)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER PREVIOUS PAGE

MEASUREMENT PROCEDURE

1. The audio signal generator was connected to the audio input circuit/microphone of the E.U.T. as for "Frequency Response of the Audio Modulating Circuit."

2. The modulation response was measured for each of three tones (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 audio input level was varied from 30% modulation (±3.6 kHz deviation) to at least 20 dB higher than the saturation point.

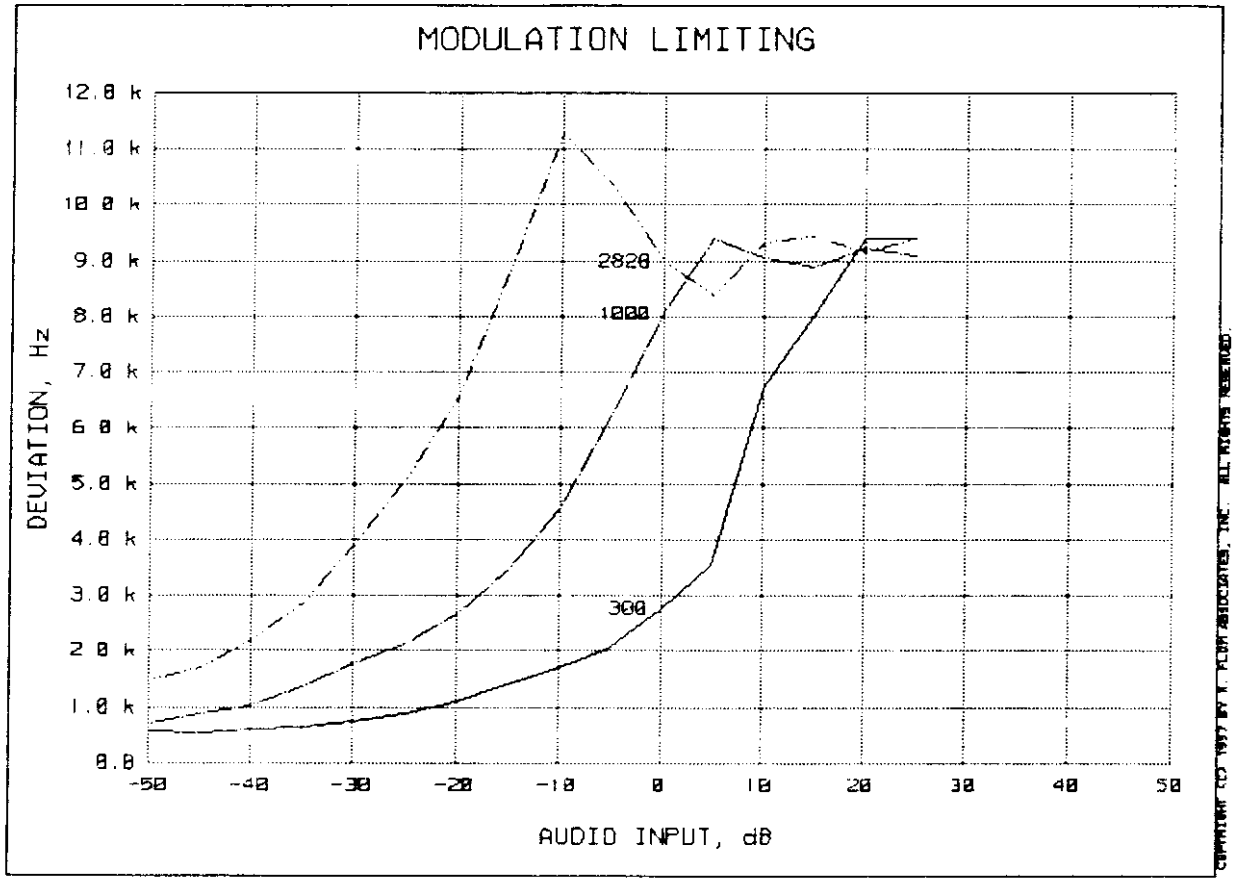
4. Measurements were performed for both negative and positive modulation and the respective results were recorded.

5. MEASUREMENT RESULTS: ATTACHED FOR

COMPANDOR ON:

1. VOICE x
2. VOICE + SAT x

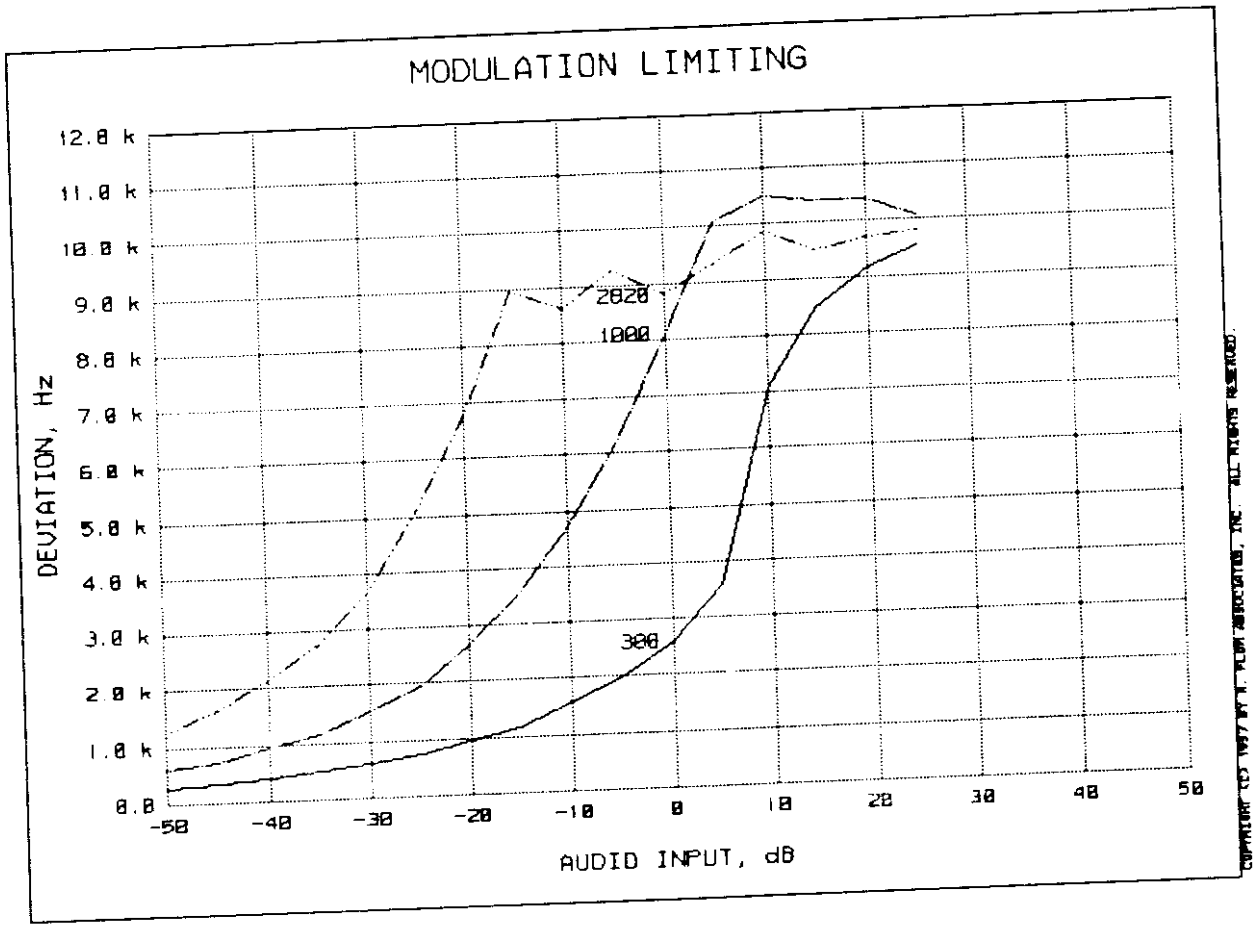
PAGE 15.1.
MODULATION LIMITING
NOKIA, 6160
1997-NOV-17, 12:55



COMMENT	= VOICE ONLY
REFERENCE DEVIATION, kHz	= 8
REFERENCE MODULATION, Hz	= 1000
PEAKS	= POSITIVE
AUDIO AMPLITUDE, mV	= 192.34

SUPERVISED BY: MORTON FLOM, P. Eng.

PAGE 15.2.
MODULATION LIMITING
NOKIA, 6160
1997-NOV-17, 12:55

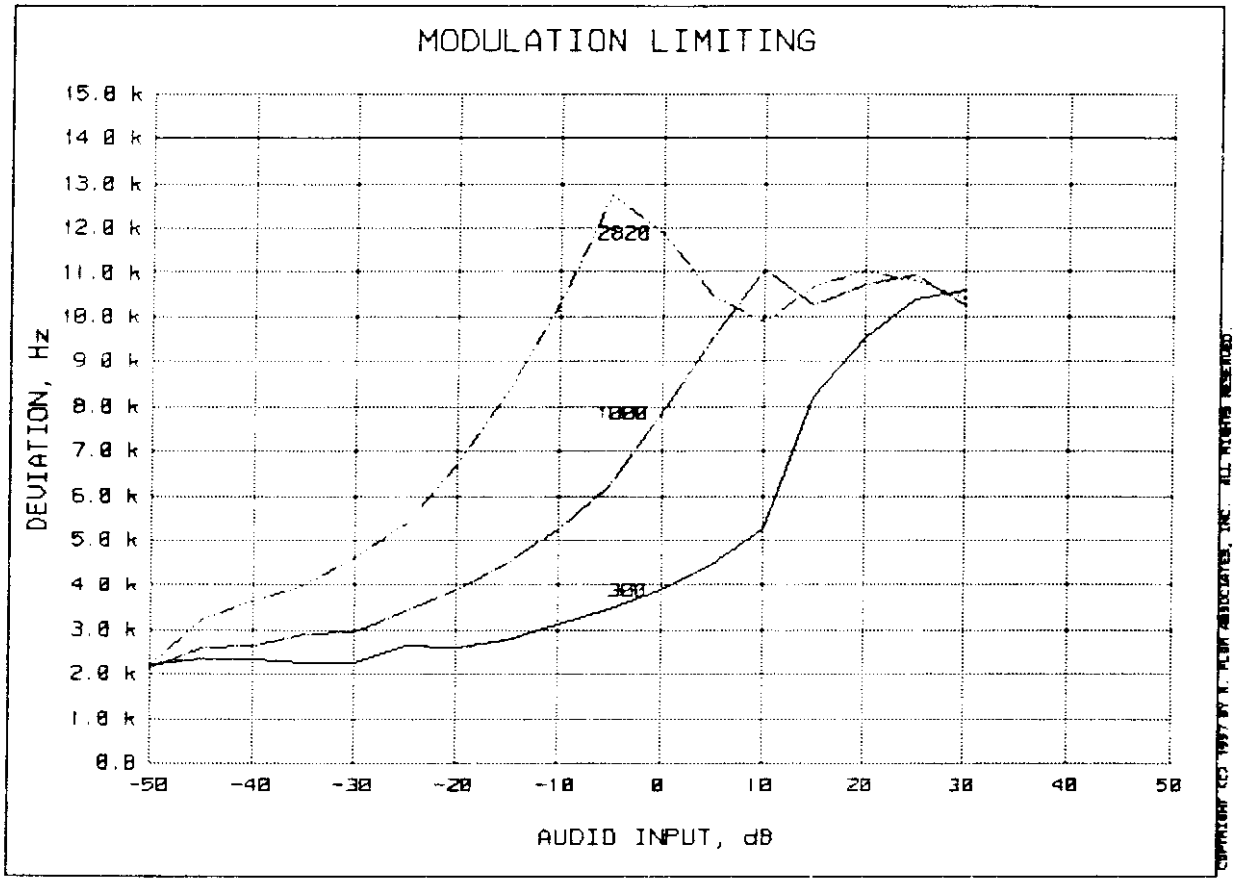


COMMENT	= VOICE ONLY
REFERENCE DEVIATION, kHz	= 8
REFERENCE MODULATION, Hz	= 1000
PEAKS	= NEGATIVE
AUDIO AMPLITUDE, mV	= 206.1

MORTON FLOM, P. Eng.

SUPERVISED BY:

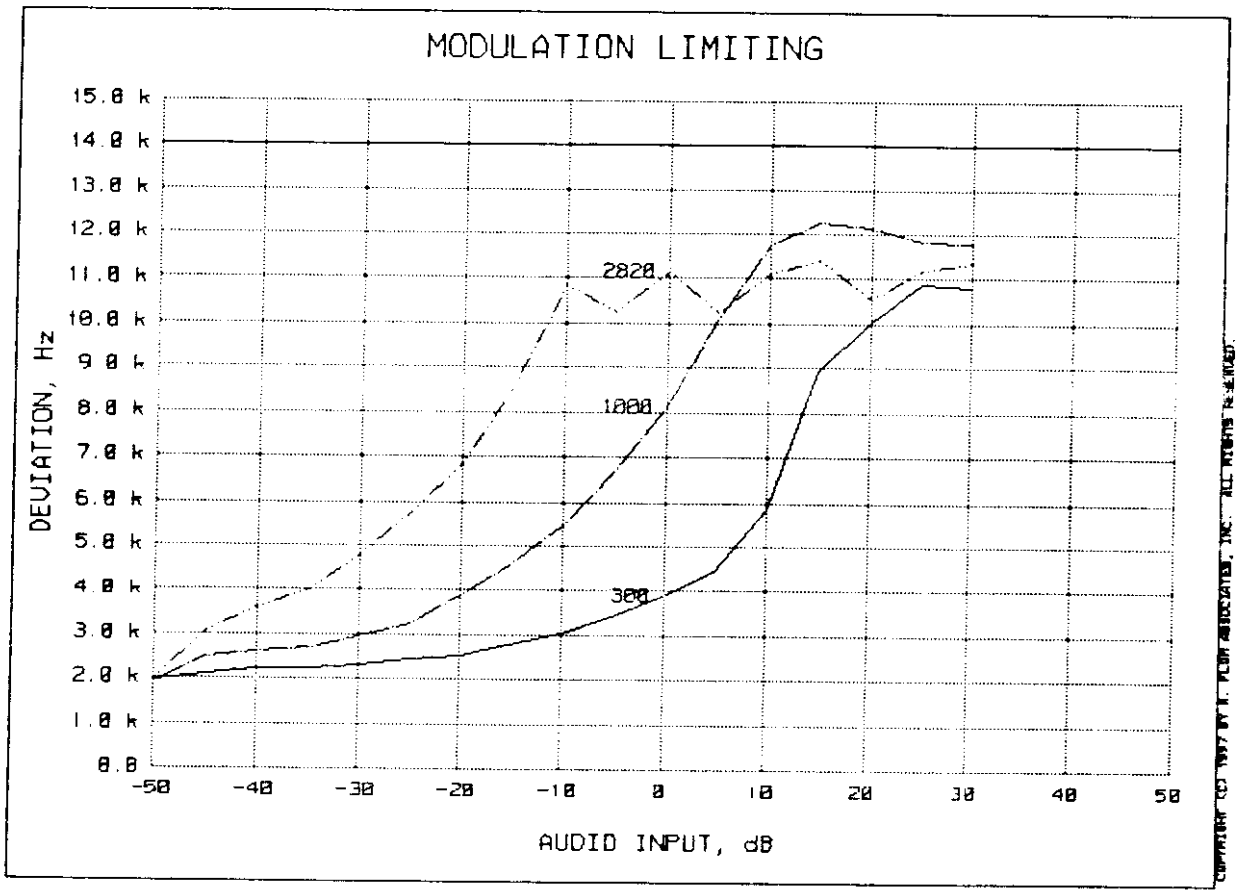
PAGE 15.3.
MODULATION LIMITING
NOKIA, 6160
1997-NOV-17, 13:01



COMMENT	= VOICE + SAT
REFERENCE DEVIATION, kHz	= 8
REFERENCE MODULATION, Hz	= 1000
PEAKS	= POSITIVE
AUDIO AMPLITUDE, mV	= 108.16

SUPERVISED BY: MORTON FLOM, P. Eng.

PAGE 15.4.
MODULATION LIMITING
NOKIA, 6160
1997-NOV-17, 13:01



COMMENT	= VOICE + SAT
REFERENCE DEVIATION, kHz	= 8
REFERENCE MODULATION, Hz	= 1000
PEAKS	= NEGATIVE
AUDIO AMPLITUDE, mV	= 122.77

SUPERVISED BY:

MORTON FLOM, P. Eng.

NAME OF TEST: OSCILLOSCOPE PRESENTATION OF TONES
MEASUREMENT OF MAXIMUM DEVIATION

PARAGRAPH:

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The presentation of tones was obtained by attaching the HP 54502A Oscilloscope to the modulation output of the HP 8901 Modulation Analyzer.

2. The E.U.T. was modulated by an HP 8903 Audio Analyzer and/or internally generated signals.

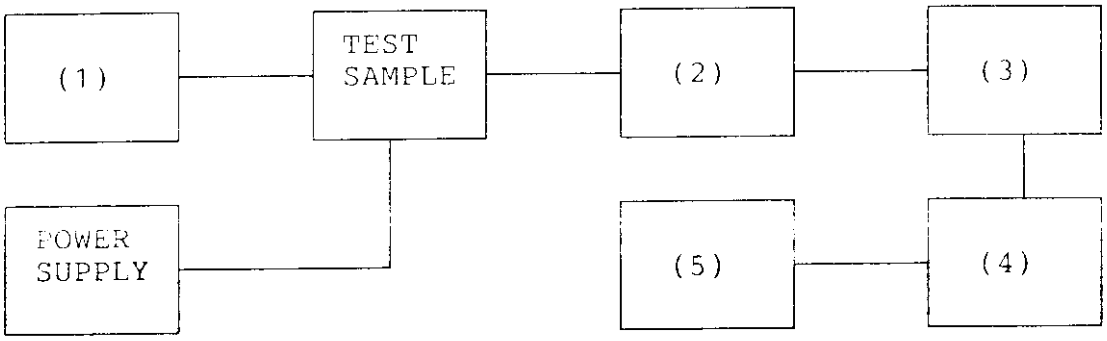
3. Oscillographic presentations and maximum deviation measurements were recorded for the various configurations.

4. MEASUREMENT RESULTS: ATTACHED SUMMARY FOR DEVIATION

5. MEASUREMENT RESULTS: ATTACHED PLOTS FOR TONES

TRANSMITTER SPURIOUS EMISSION

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



(1) AUDIO OSCILLATOR/GENERATOR

HP 204D	___
HP 8903A	x
_____	___

(2) COAXIAL ATTENUATOR

NARDA 766-10	x
SIERRA 661A-30	___
_____	___

(3) FILTERS; NOTCH, HP, LP, BP

CIRQTEL FHT	___
EAGLE TNF-1	x
PHELPS DODGE PD-495-8	___
_____	___

(4) SPECTRUM ANALYZER

HP 8566B	x
HP 8563E	___
_____	___

(5) SCOPE

HP 54502A	x
_____	___

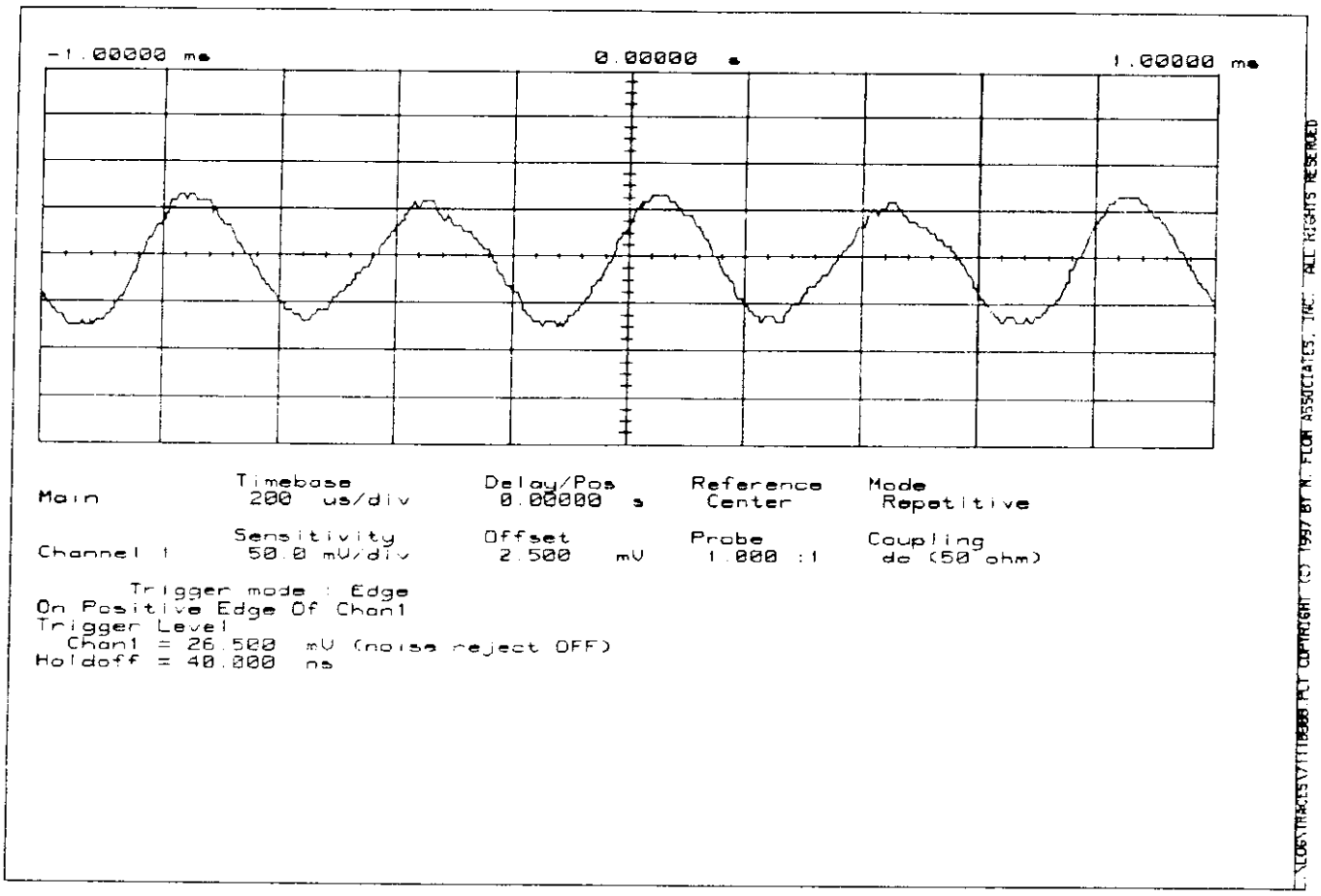
MEASUREMENT SUMMARY: OSCILLOSCOPE PRESENTATION OF TONES
MEASUREMENT OF MAXIMUM DEVIATION

MODULATION	DEVIATION, ±kHz
(a) VOICE	10.2
(b) WIDEBAND DATA	8.0
(c) SAT	2.0
(d) ST	7.5
(e) SAT + VOICE	11.6
(f) SAT + DTMF	11.1
(g) CDMA	N/A
(h) TDMA	N/A
(i) NAMPS VOICE	N/A
(j) NAMPS DSAT	N/A
(k) NAMPS ST	N/A
(l) NAMPS VOICE	N/A

SUPERVISED BY: MORTON FLOM, P. Eng.

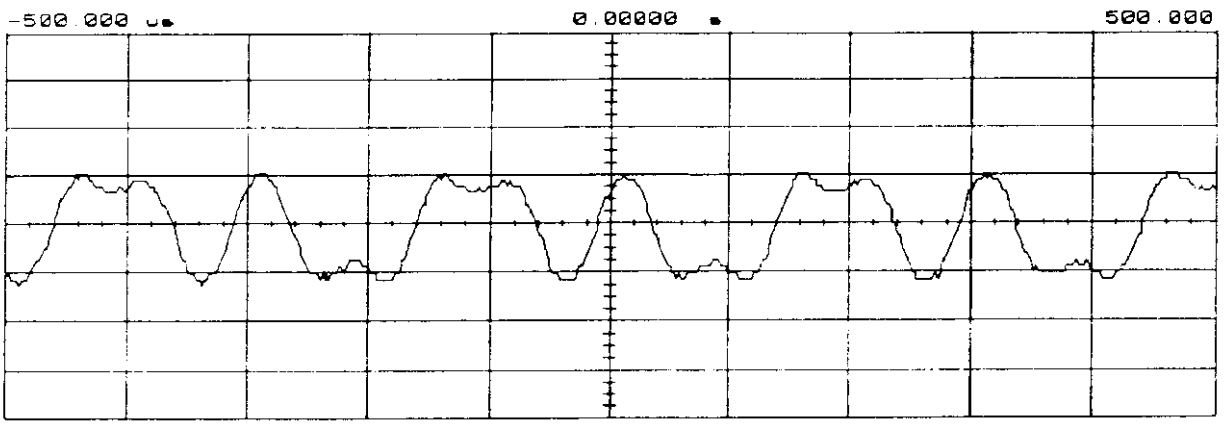
PAGE 19.1.
OSCILLOSCOPE PRESENTATION
NOKIA, 6160
1997-NOV-18, 10:37, TUE

MODULATION: VOICE



OSCILLOSCOPE PRESENTATION
NOKIA, 6160
1997-NOV-18, 10:25, TUE

MODULATION: WBD

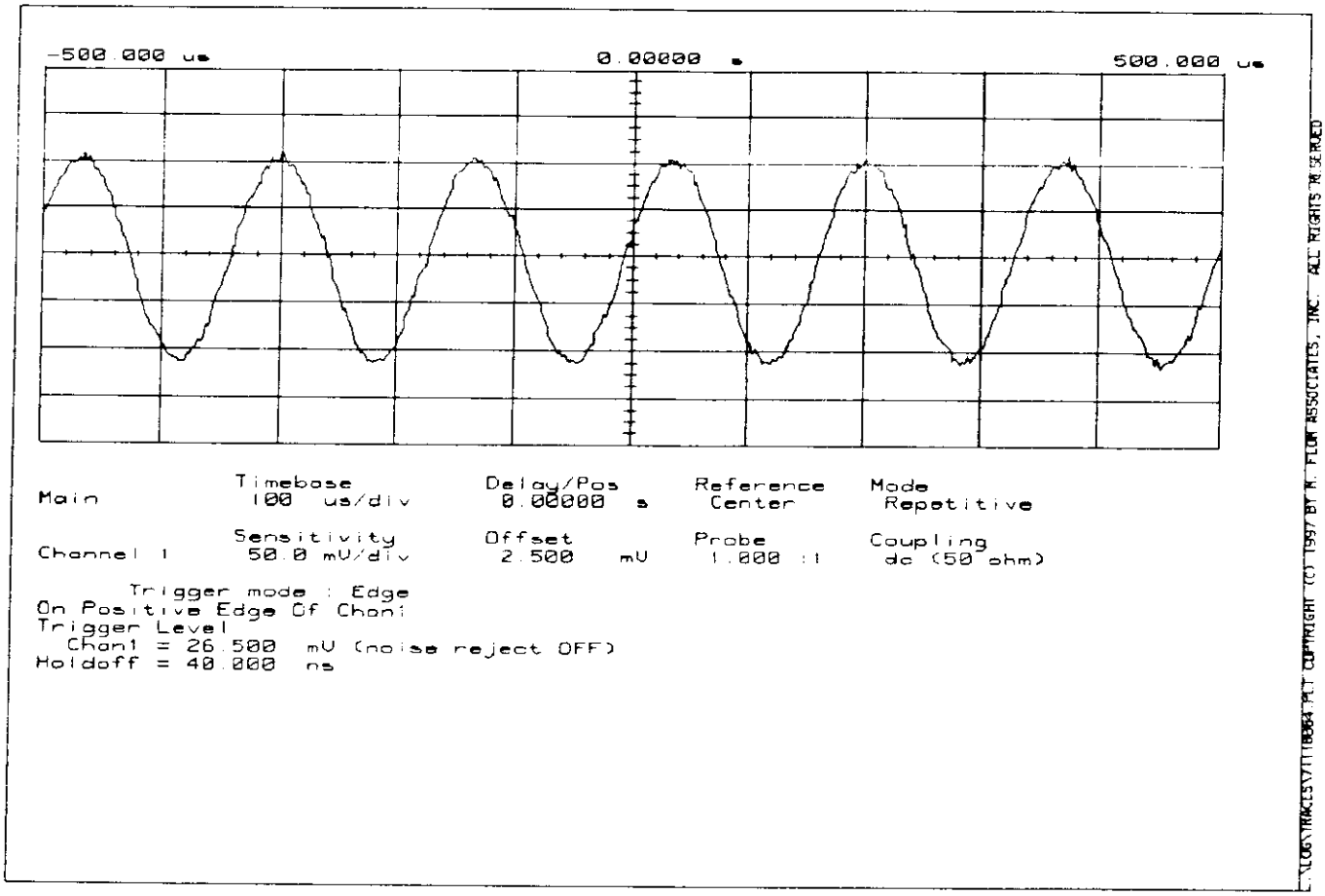


	Timebase	Delay/Pos	Reference	Mode
Main	100 us/div	0.00000 s	Center	Repetitive
	Sensitivity	**Offset**	**Probe**	**Coupling**
Channel 1	50.0 mV/div	2.500 mV	1.000 :1	dc (50 ohm)

Trigger mode : Edge
On Positive Edge Of Chan1
Trigger Level
Chan1 = 26.500 mV (noise reject OFF)
Holdoff = 40.000 ns

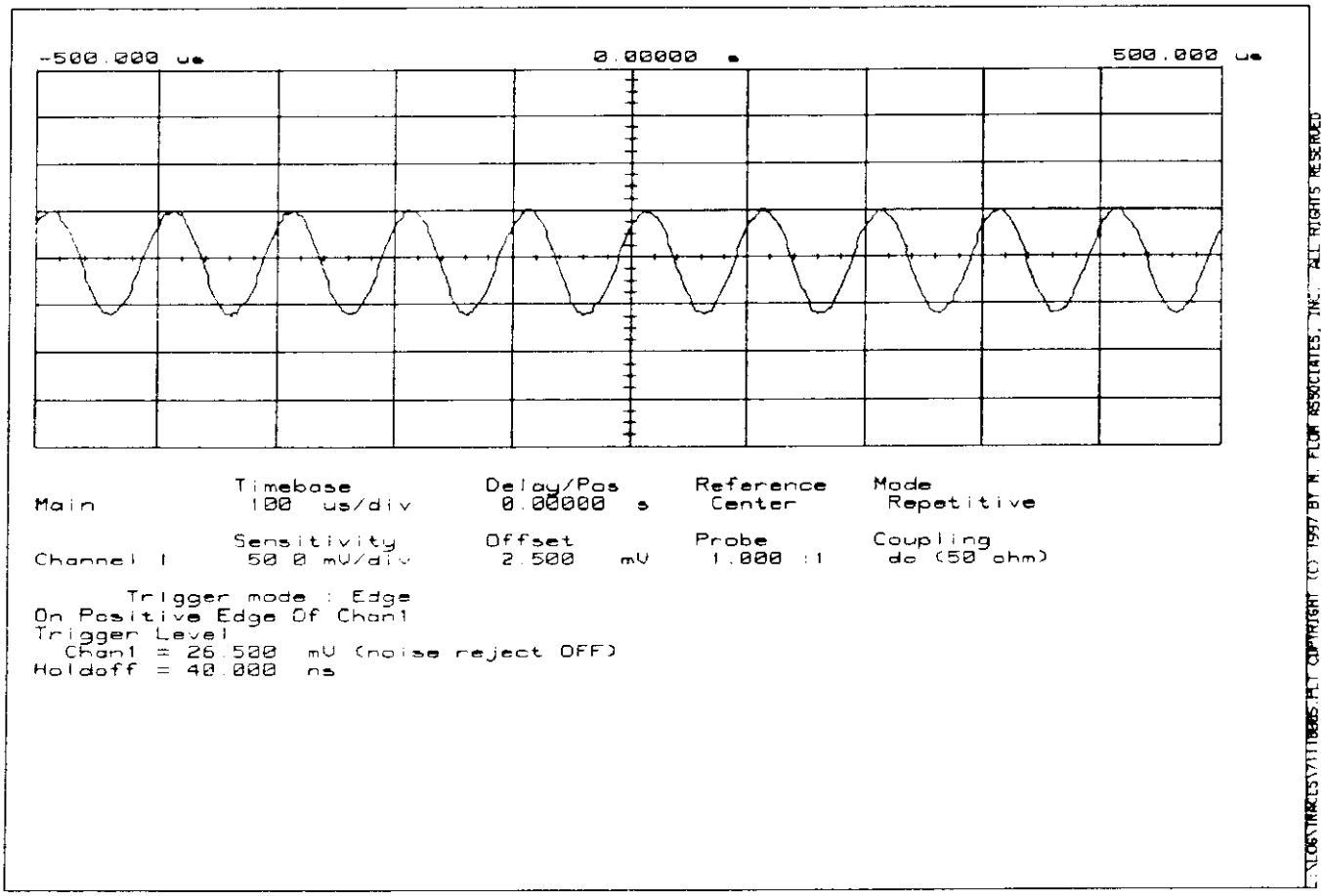
PAGE 19.3.
OSCILLOSCOPE PRESENTATION
NOKIA, 6160
1997-NOV-18, 10:28, TUE

MODULATION: SAT



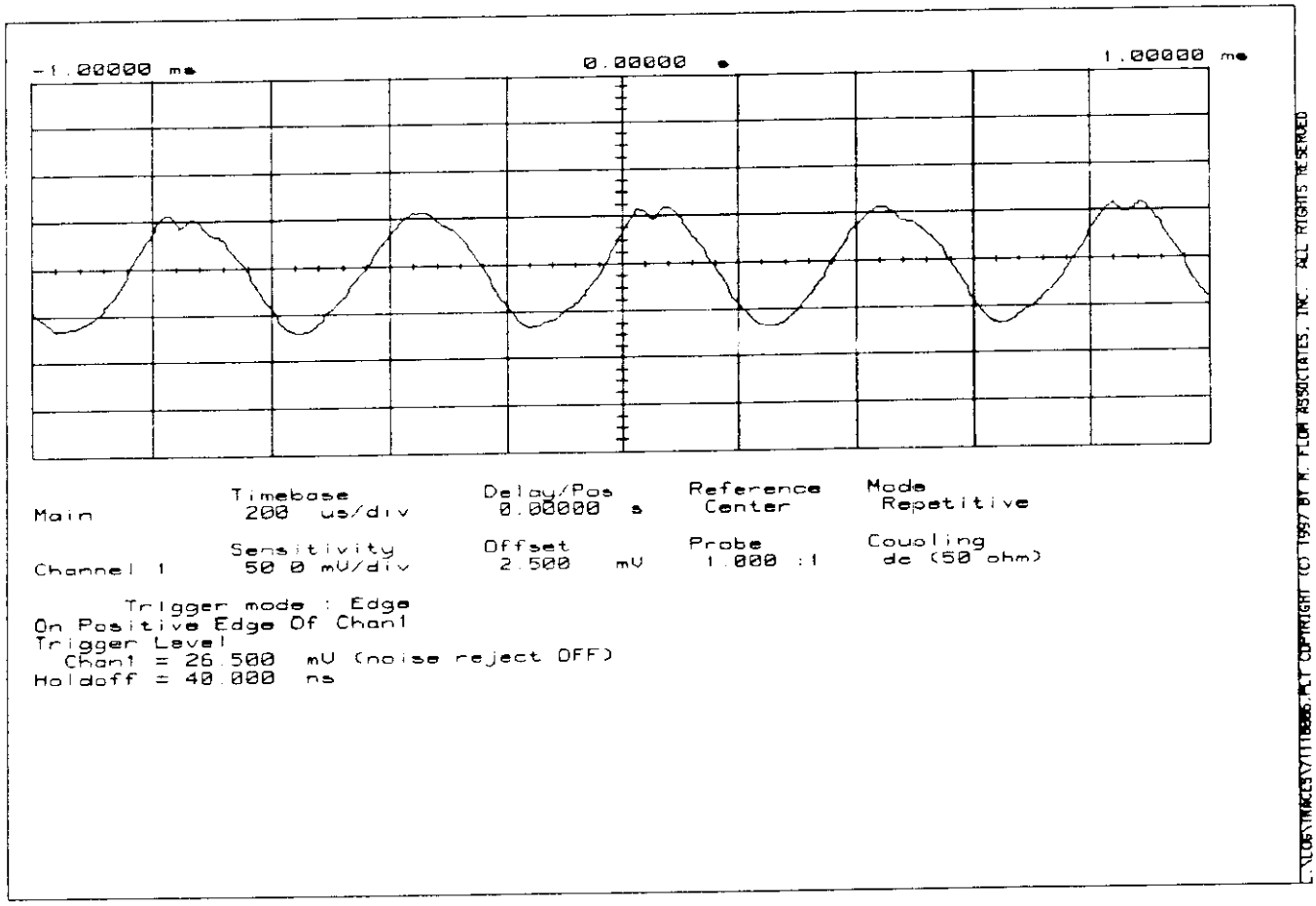
PAGE 19.4.
OSCILLOSCOPE PRESENTATION
NOKIA, 6160
1997-NOV-18, 10:31, TUE

MODULATION: ST



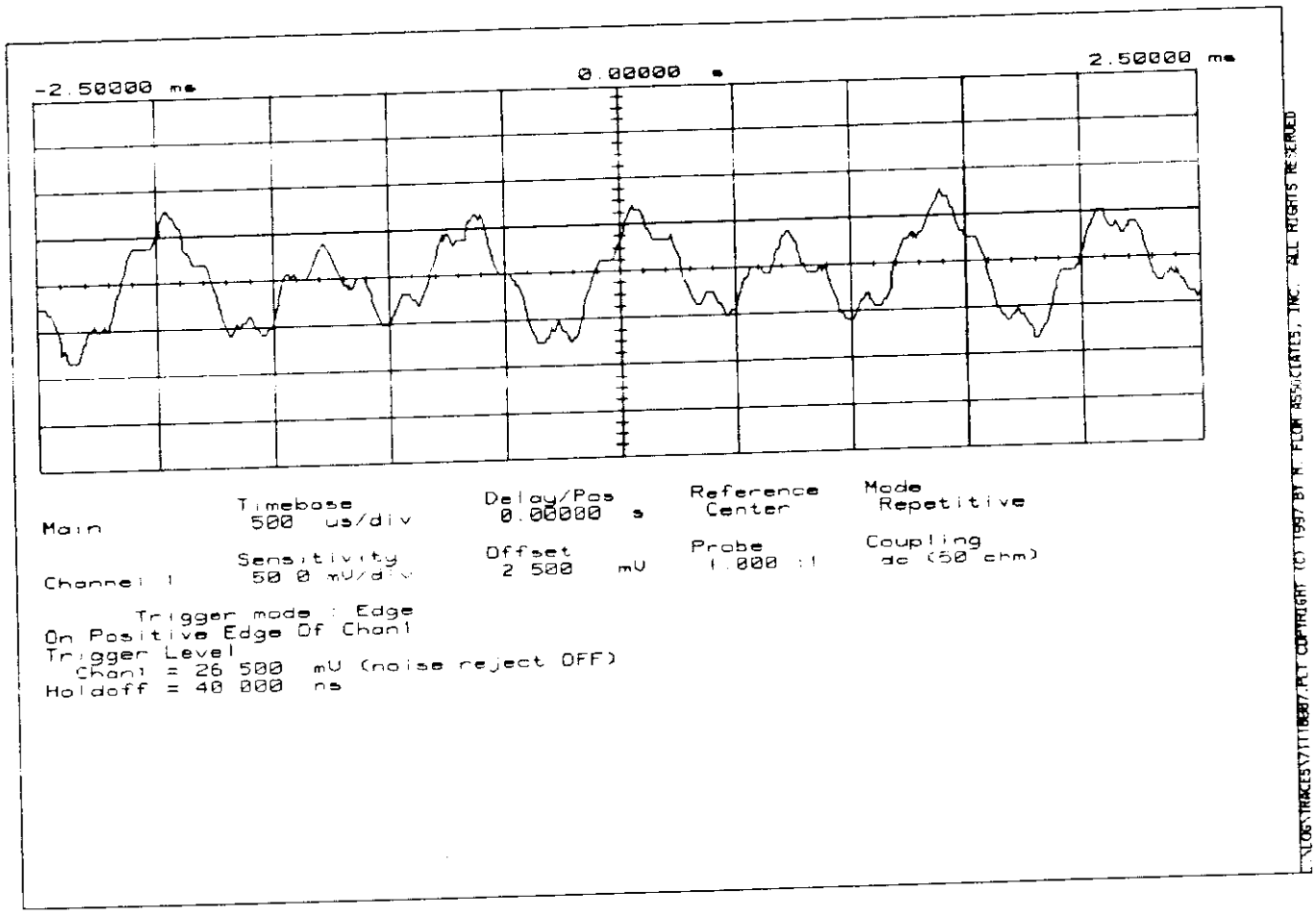
PAGE 19.5.
OSCILLOSCOPE PRESENTATION
NOKIA, 6160
1997-NOV-18, 10:33, TUE

MODULATION: SAT+VOICE



PAGE 19.6.
OSCILLOSCOPE PRESENTATION
NOKIA, 6160
1997-NOV-18, 10:34, TUE

MODULATION: SAT+DTMF



NAME OF TEST: OCCUPIED BANDWIDTH

PARAGRAPH: 47 CFR 2.989 (c)(1)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER PREVIOUS PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. and test equipment were set up as shown on the previous page, with the Spectrum Analyzer connected.

2. For voice modulated equipment, the audio signal generator was adjusted to the frequency of maximum response and with output level set for ±6 kHz deviation (or 50% modulation).

3. With level constant, the frequency was set at 6 kHz, then the signal level was increased 16 dB.

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

5. All other modulations for this equipment as available from appropriate interface devices.

6. MEASUREMENT RESULTS: ATTACHED

MEASUREMENT SUMMARY: OCCUPIED BANDWIDTH

MODULATION	MEASURED DEVIATION ±kHz (HP 8901A)	LIMIT ±kHz	B/W @ -26 dB PLOTS, kHz
NONE	0.0	0	0
VOICE	10.2	12	27
WIDEBAND DATA	8.0	8	23
SAT + VOICE	11.6	N/A	24
SAT + DTMF	11.1	N/A	26
CDMA	N/A	N/A	N/A
TDMA	N/A	N/A	31
NAMPS	N/A	N/A	N/A

FOR ALL OCCUPIED BANDWIDTH PLOTS:

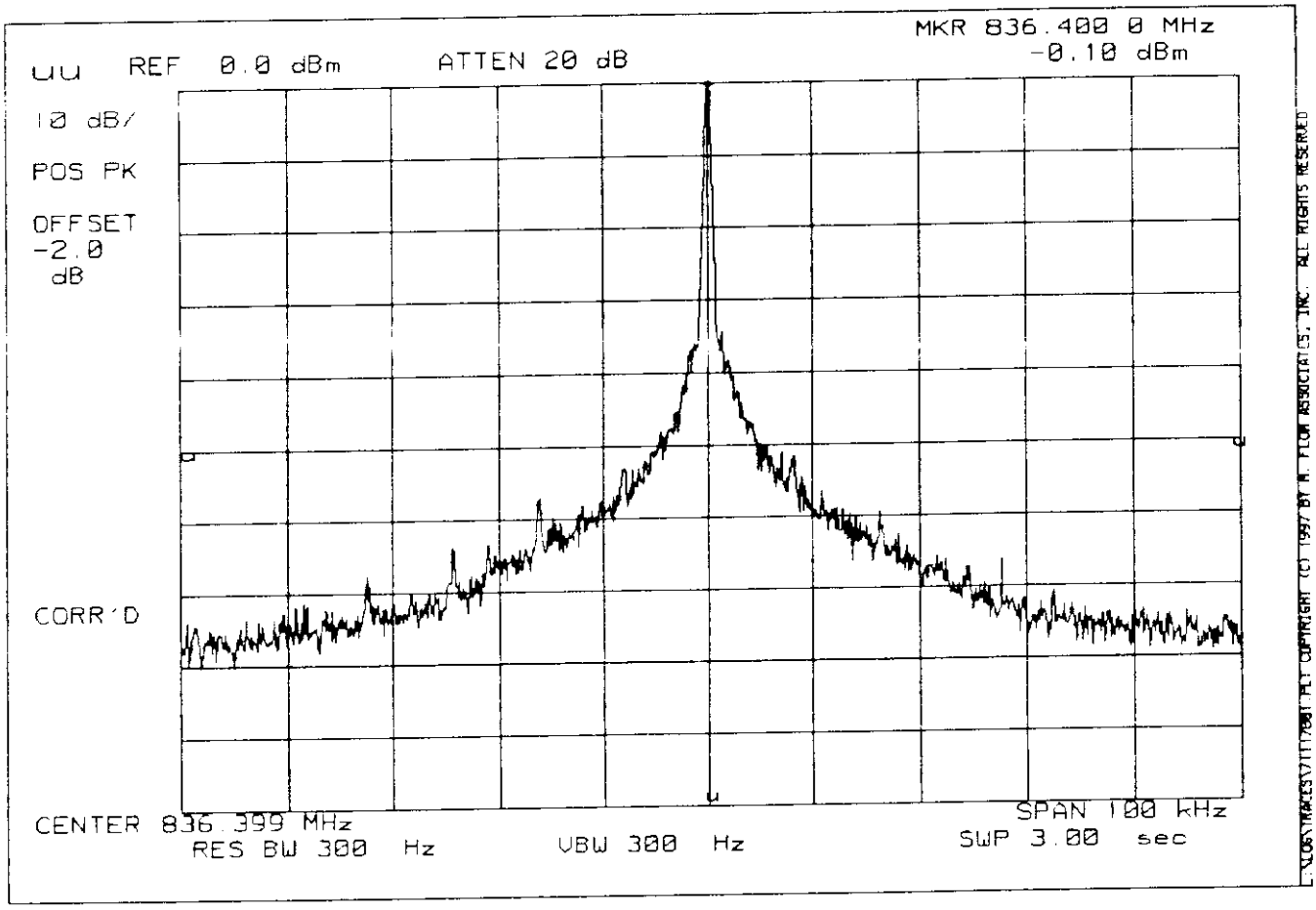
1. 0 dB REFERENCE LEVEL = TOP
2. HORIZONTAL = AS INDICATED
3. VERTICAL = AS INDICATED
4. I.F. BANDWIDTH = AS INDICATED
5. VIDEO FILTER = OFF
6. POWER OUTPUT = AS PER PAGE 2.
7. WORST CHANNEL = 380
8. WORST CASE = VOICE + SAT

SUPERVISED BY:

MORTON FLOM, P. Eng.

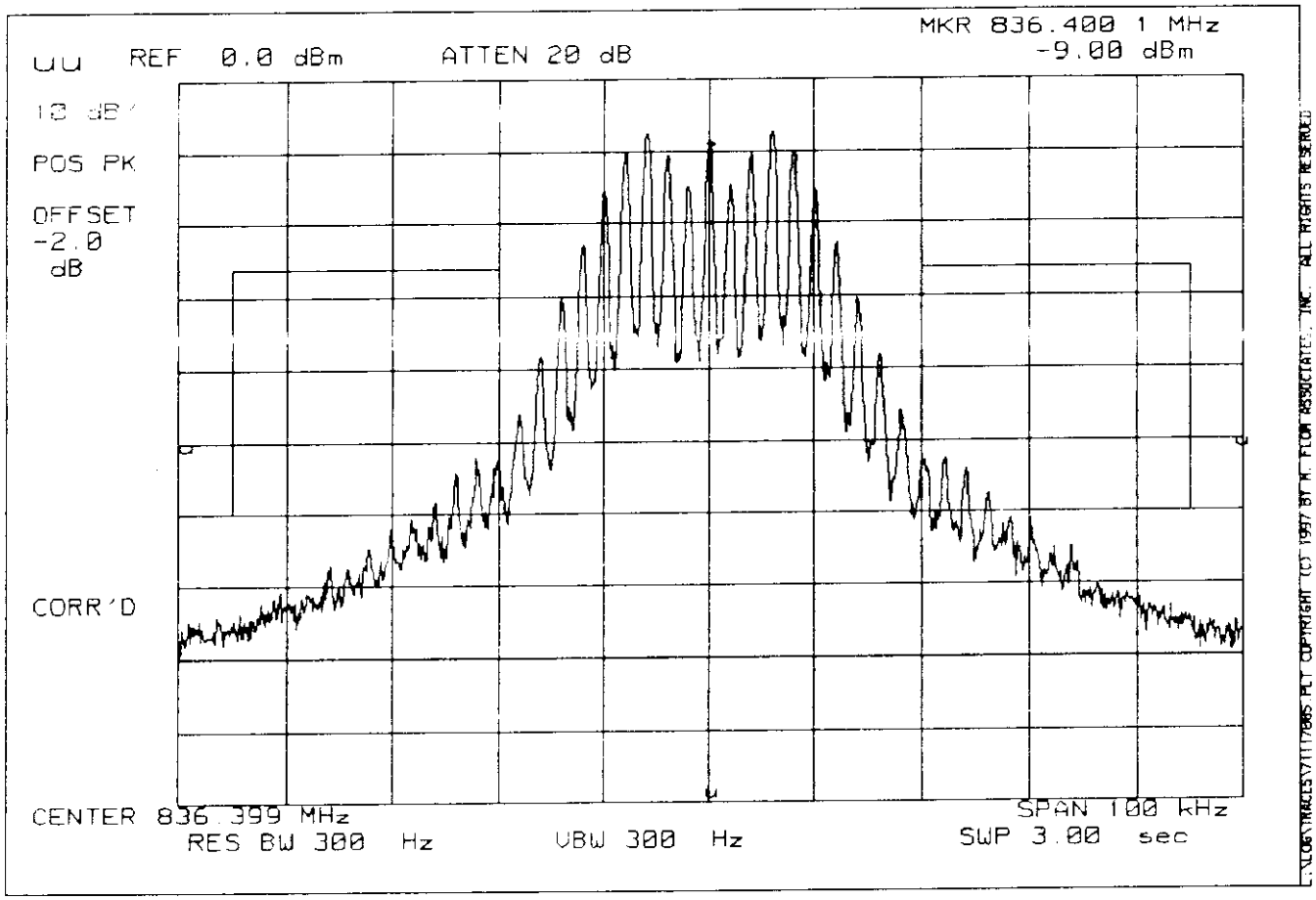
PAGE 22.1.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 14:56, MON

POWER: LOW
MODULATION: NONE



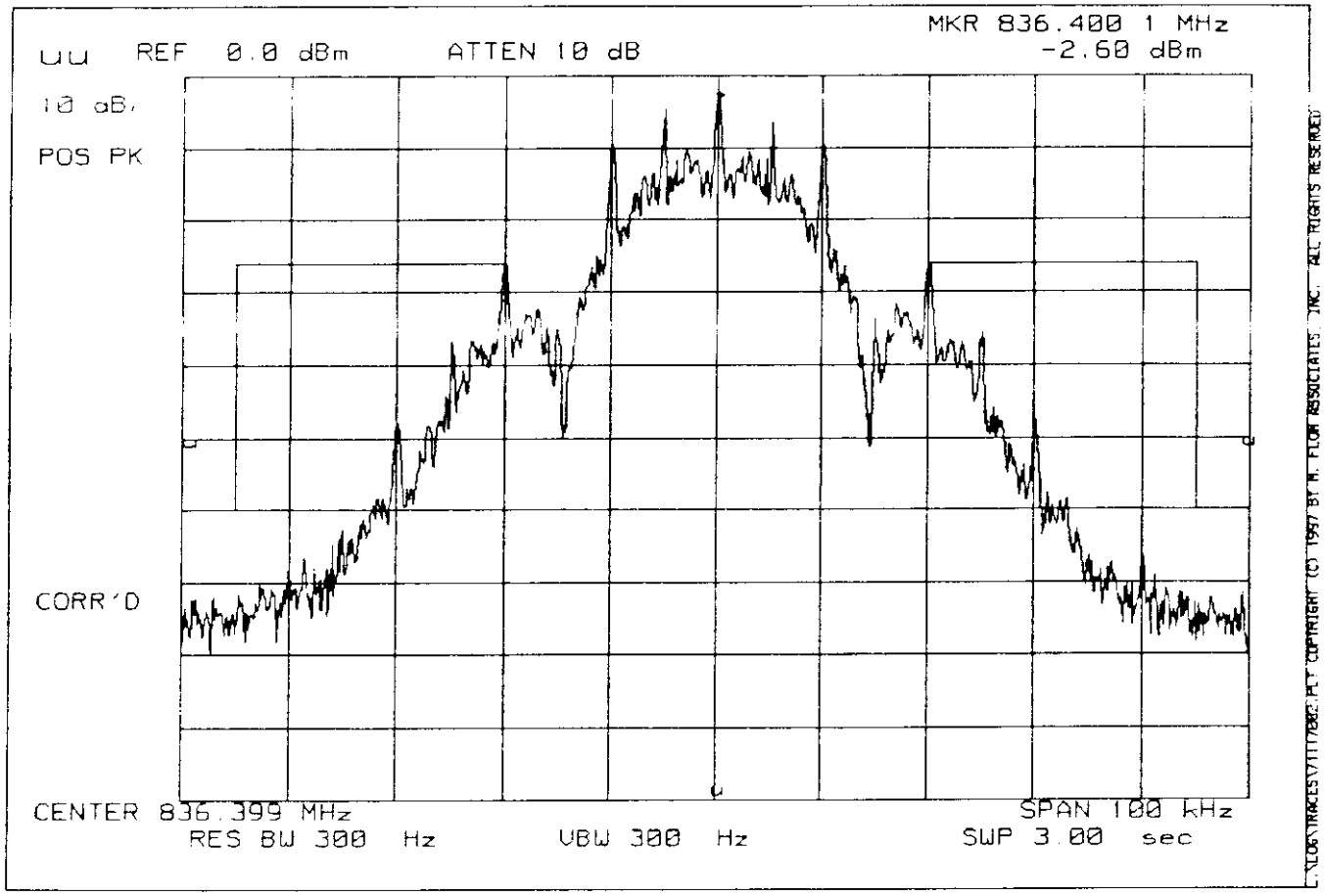
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:14, MON

POWER: LOW
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



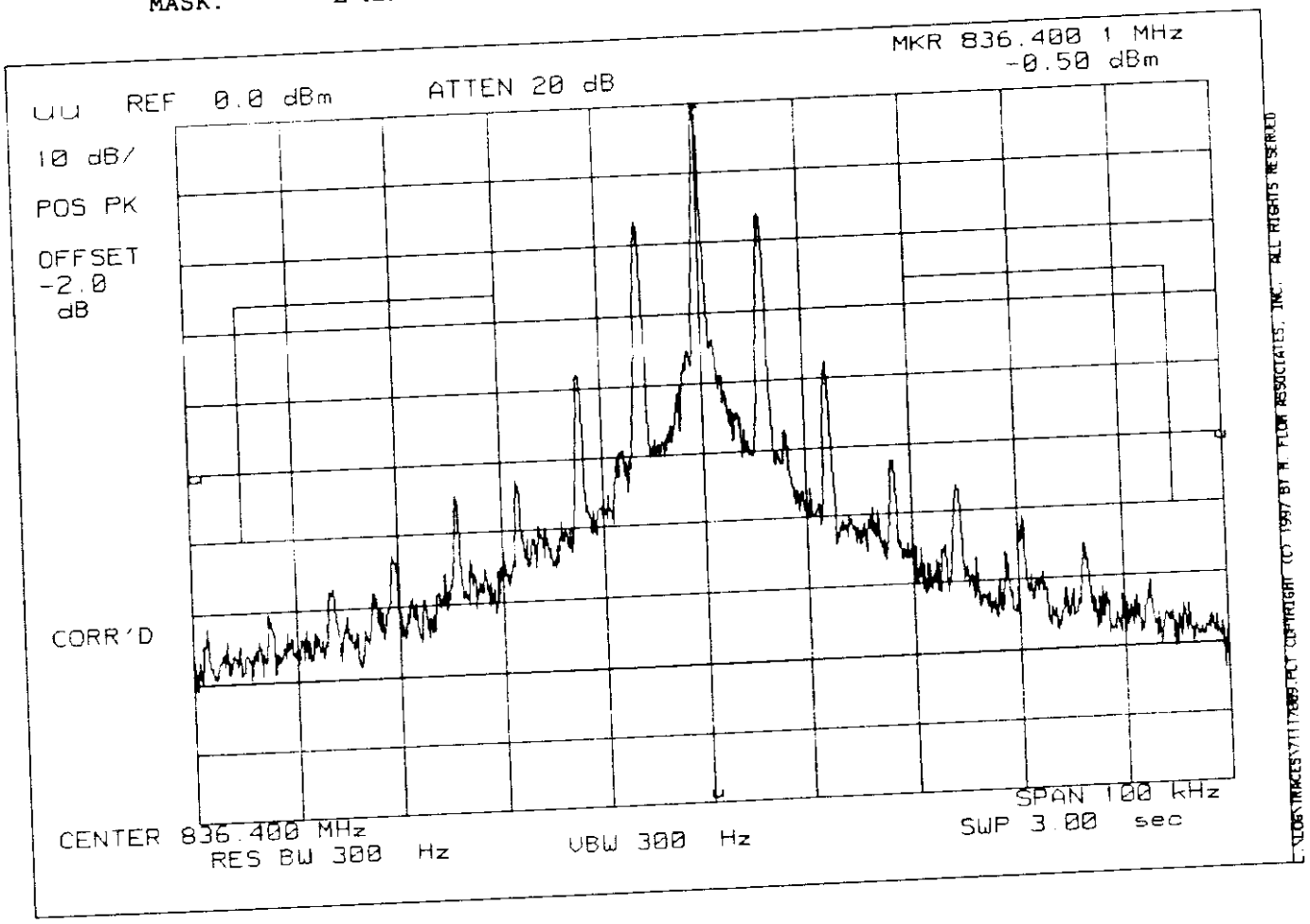
PAGE 22.3.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:05, MON

POWER: LOW
MODULATION: WBD
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



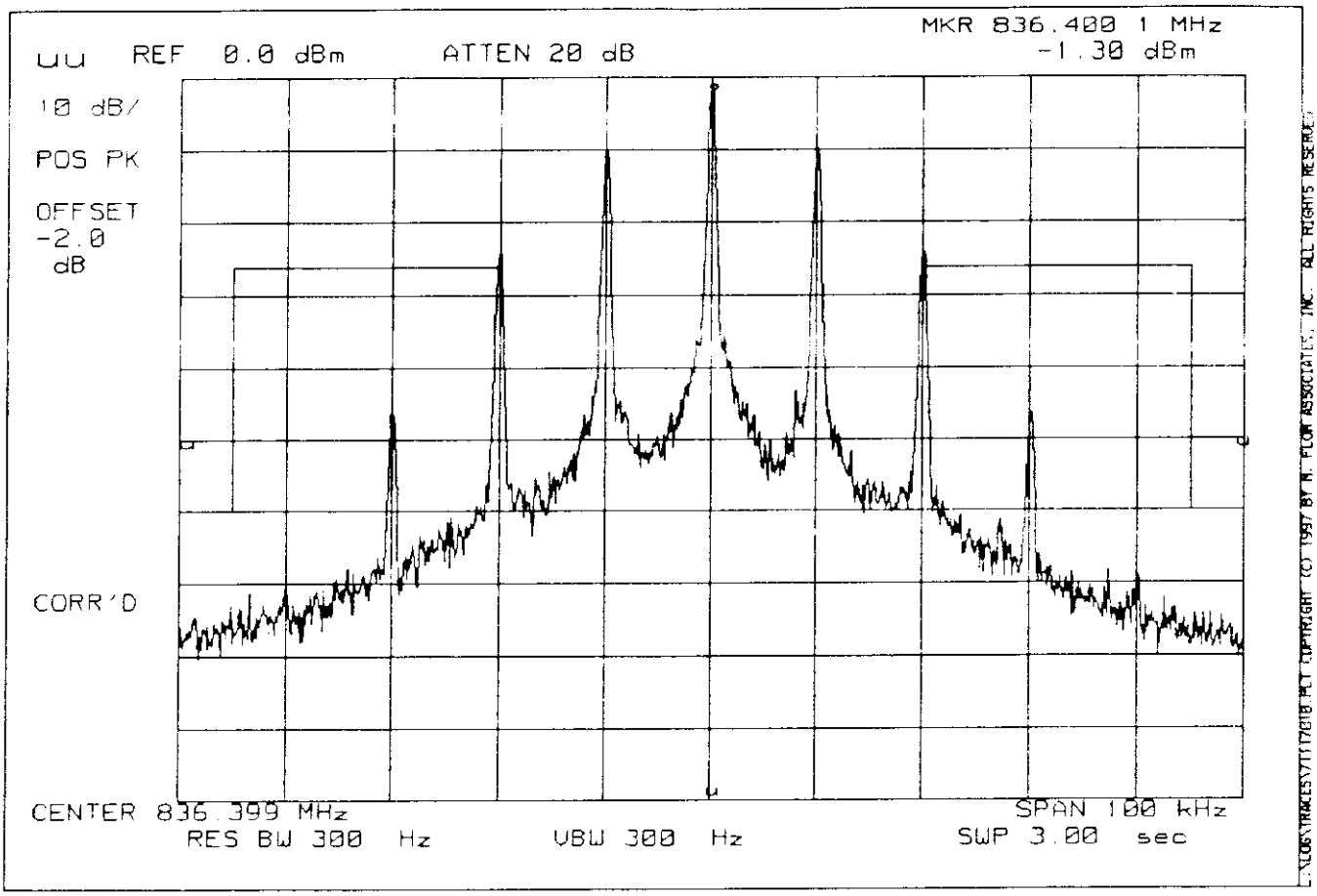
PAGE 22.4.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:27, MON

POWER: LOW
MODULATION: SAT
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



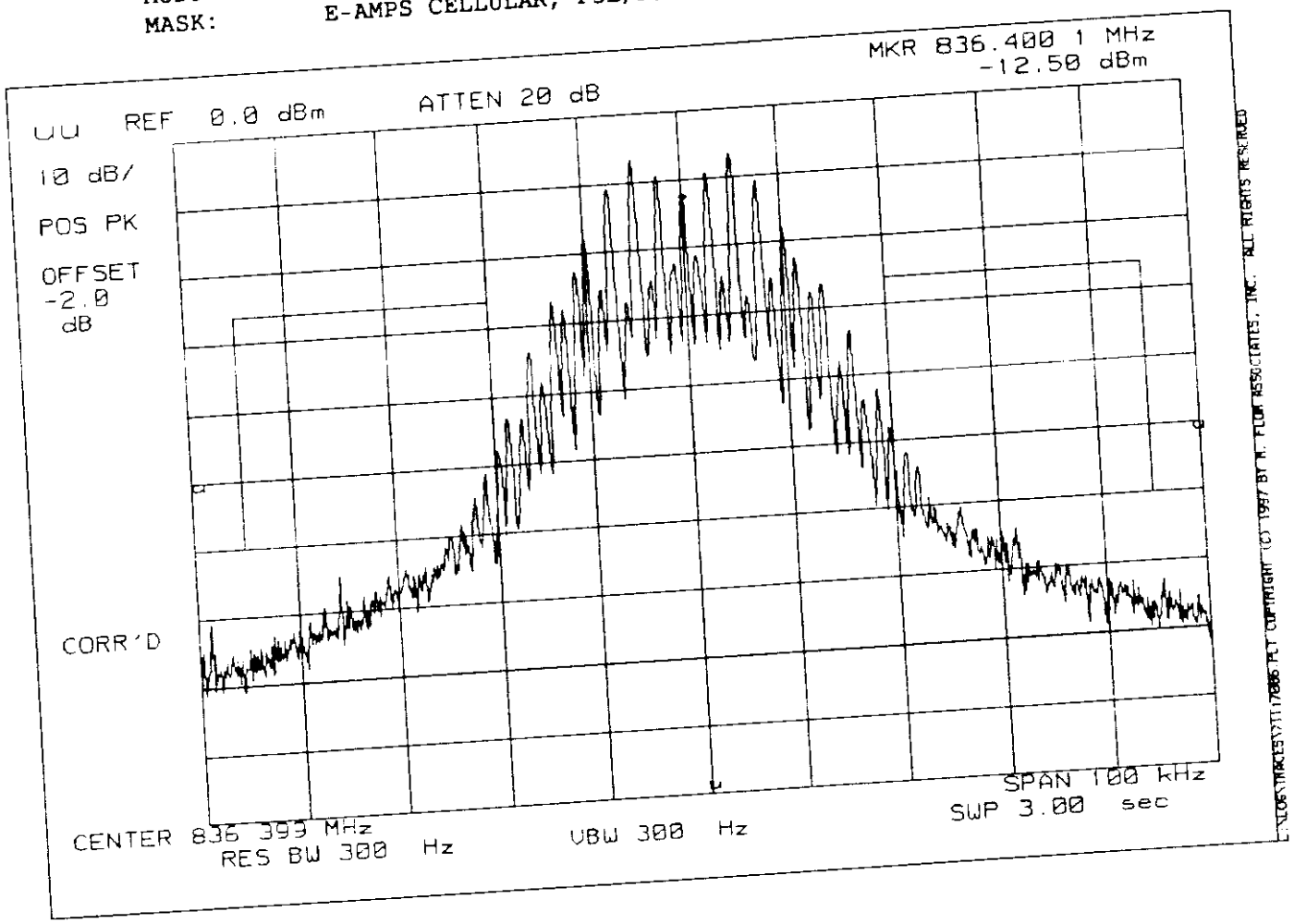
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:29, MON

POWER: LOW
MODULATION: ST
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



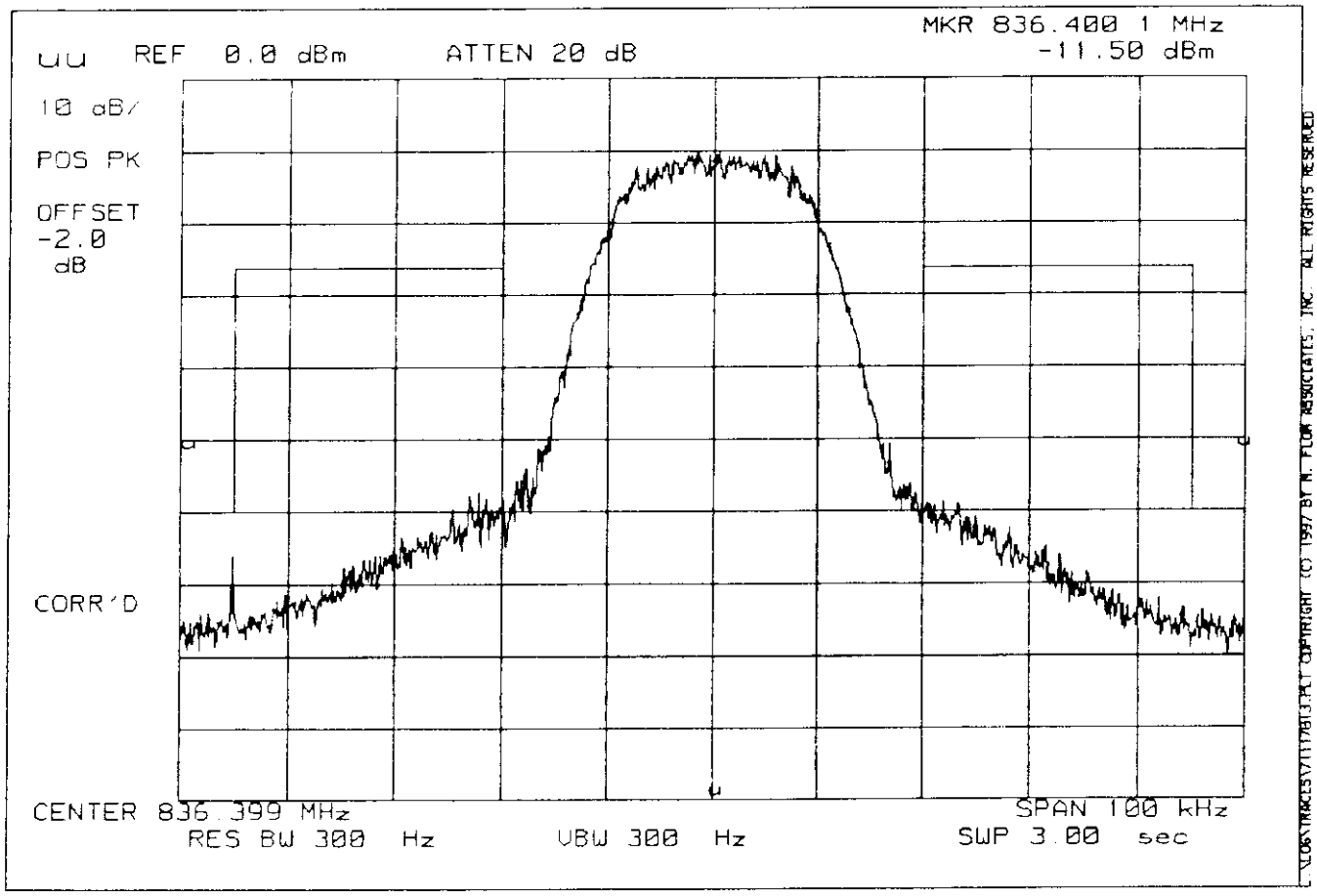
PAGE 22.6.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:22, MON

POWER: LOW
MODULATION: VOICE + SAT
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



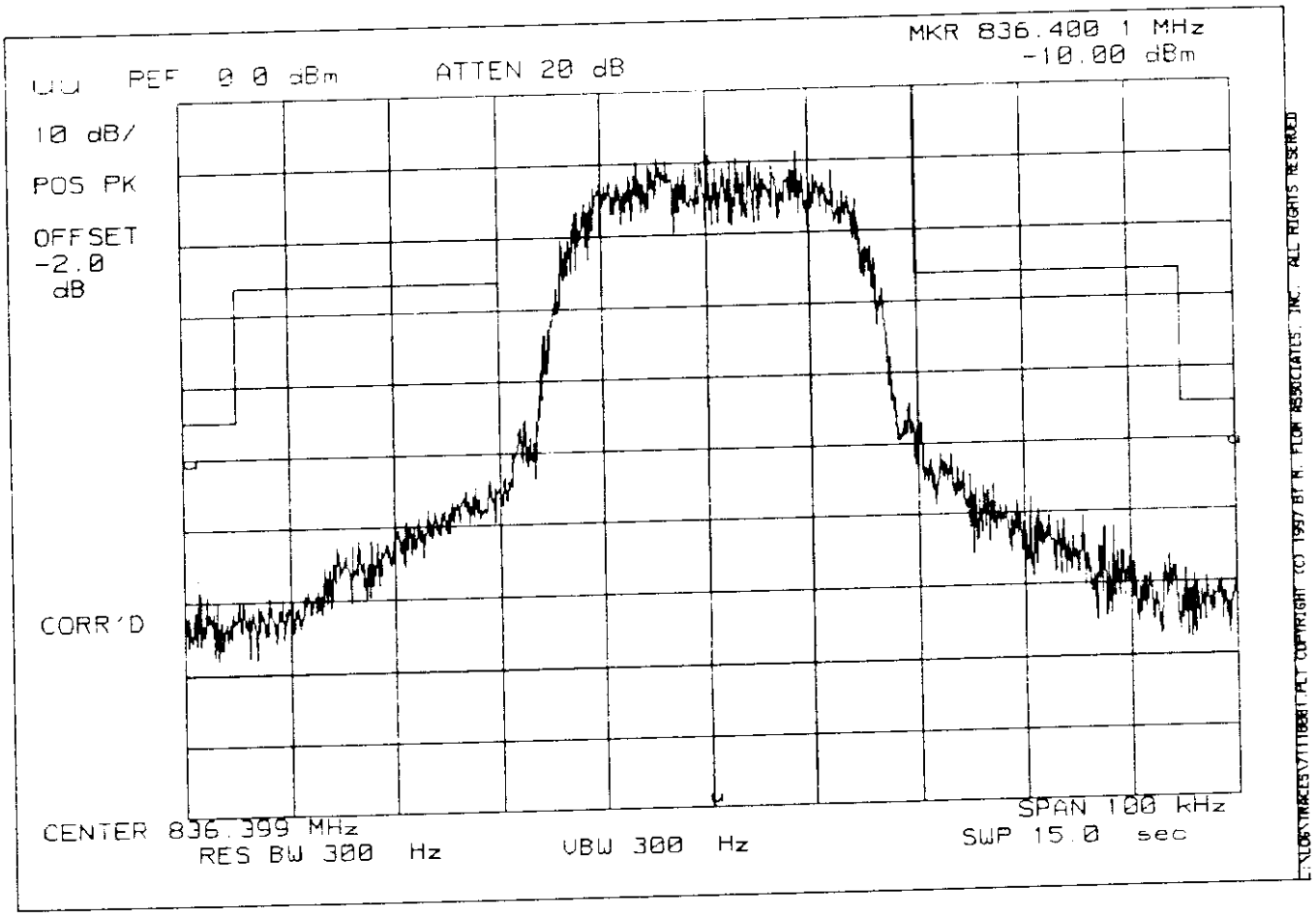
PAGE 22.7.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:34, MON

POWER: LOW
MODULATION: SAT+DTMF
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



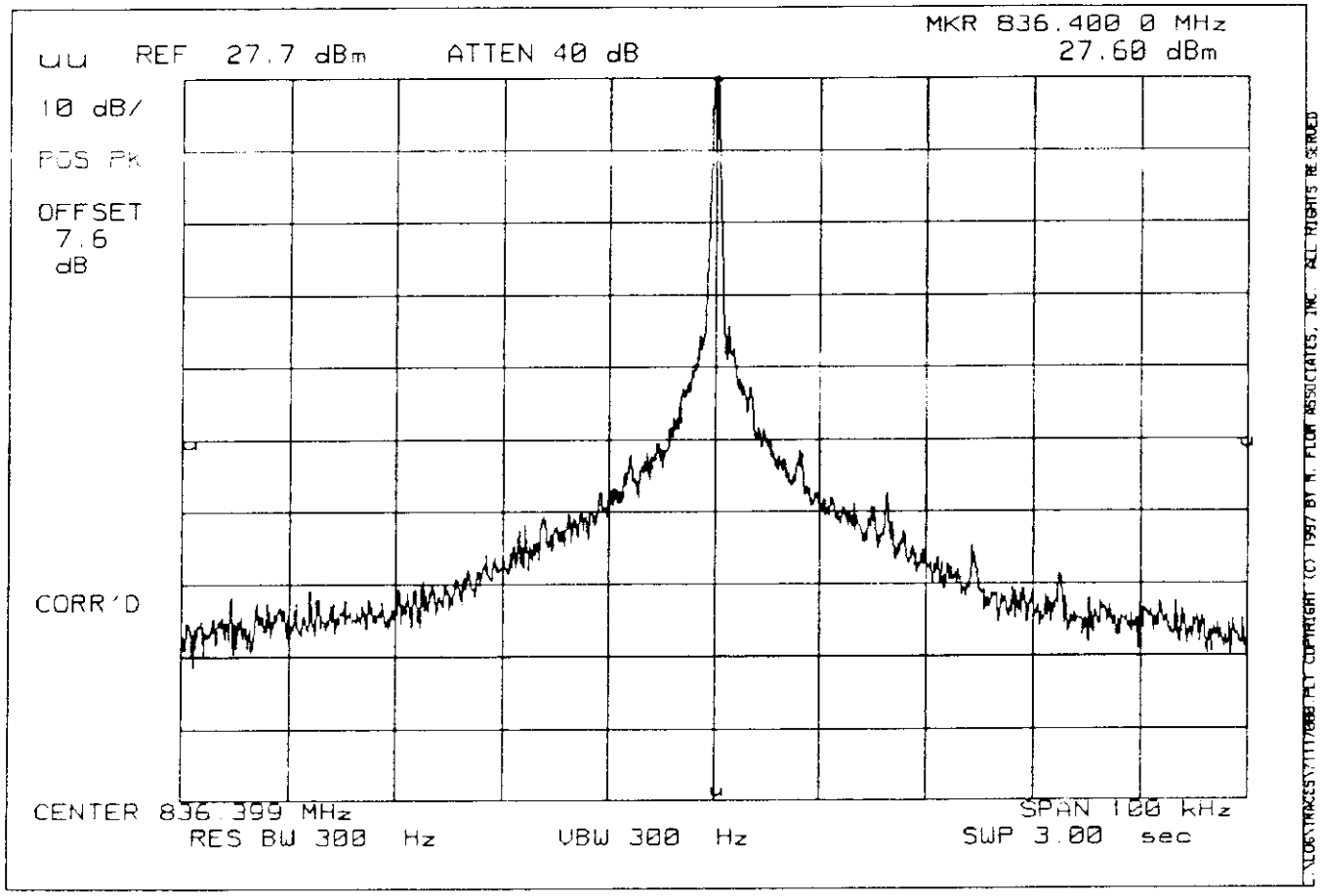
PAGE 22.8.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 08:55, TUE

POWER: LOW
MODULATION: DQPSK
MASK: E-AMPS CELLULAR, F1D, DATA



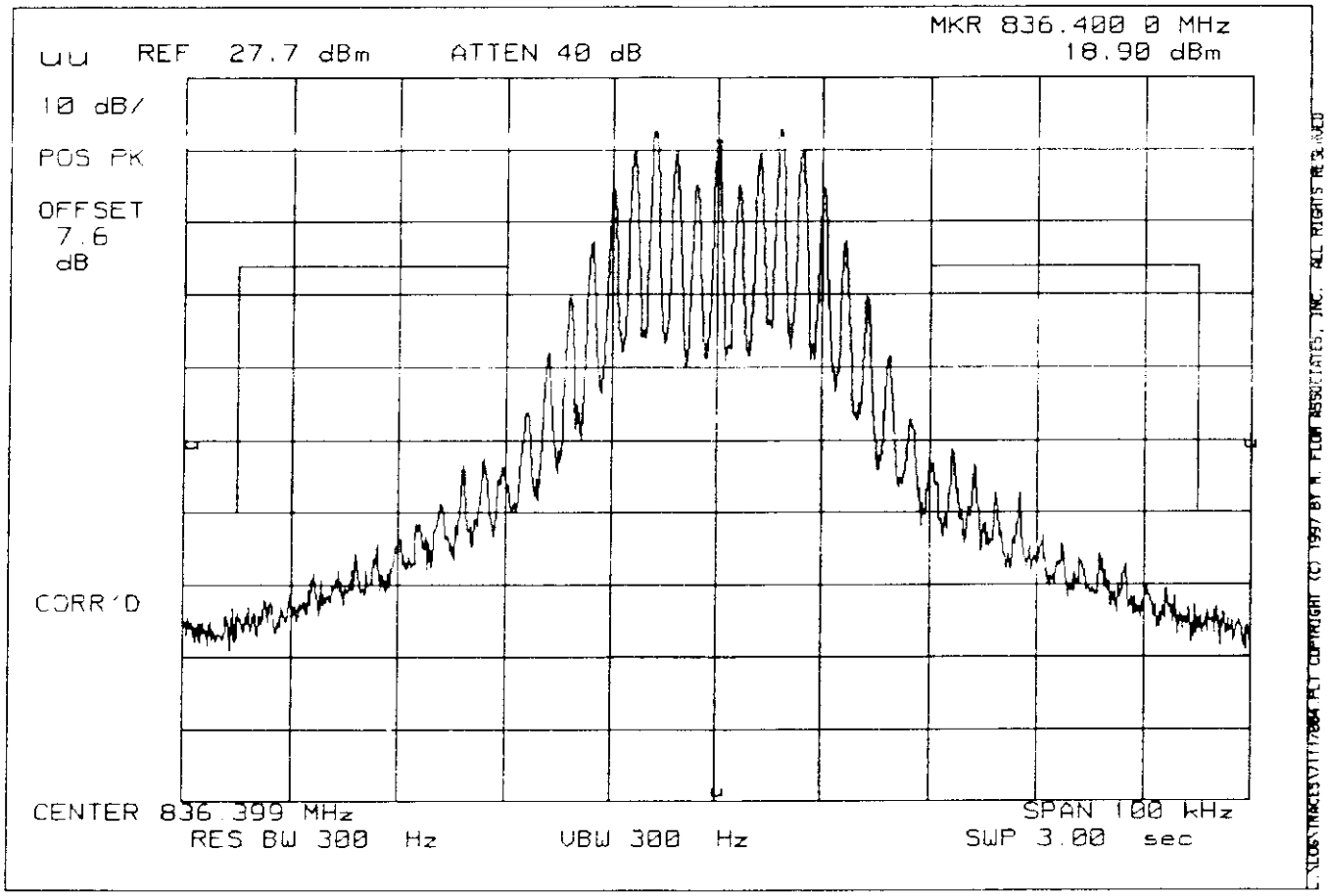
PAGE 22.9.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 14:51, MON

POWER: HIGH
MODULATION: NONE



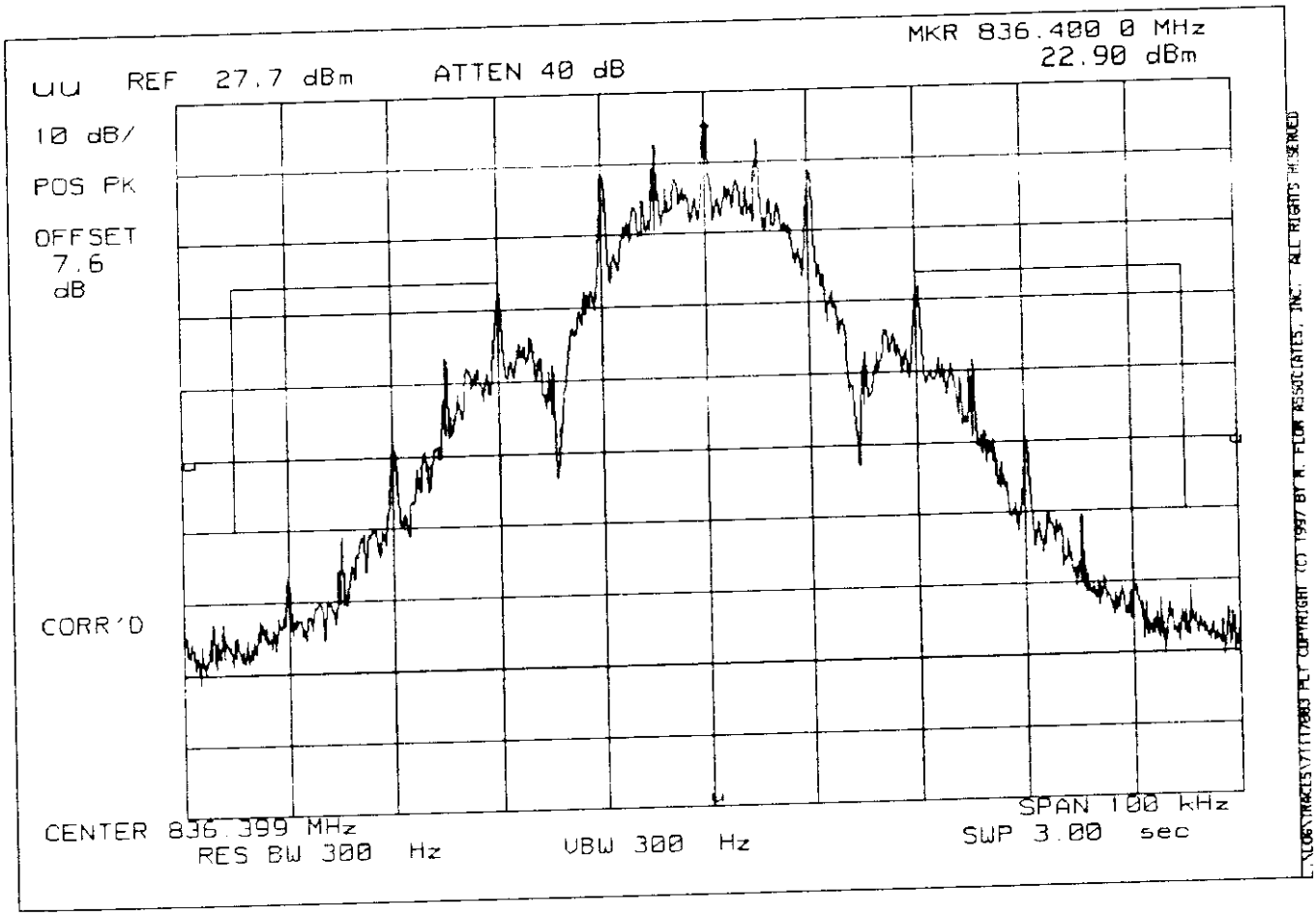
PAGE 22.10.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:13, MON

POWER: HIGH
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



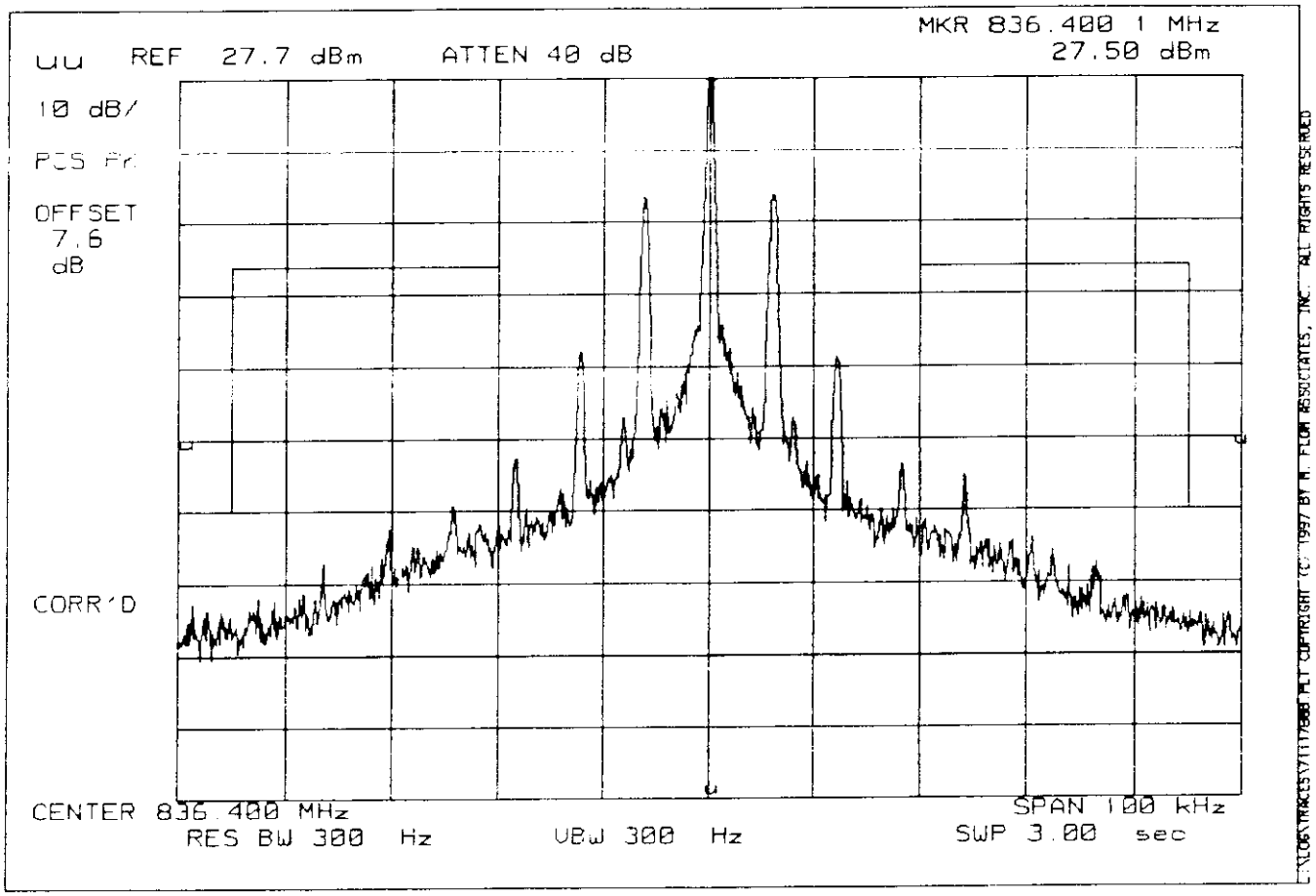
PAGE 22.11.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:06, MON

POWER: HIGH
MODULATION: WBD
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



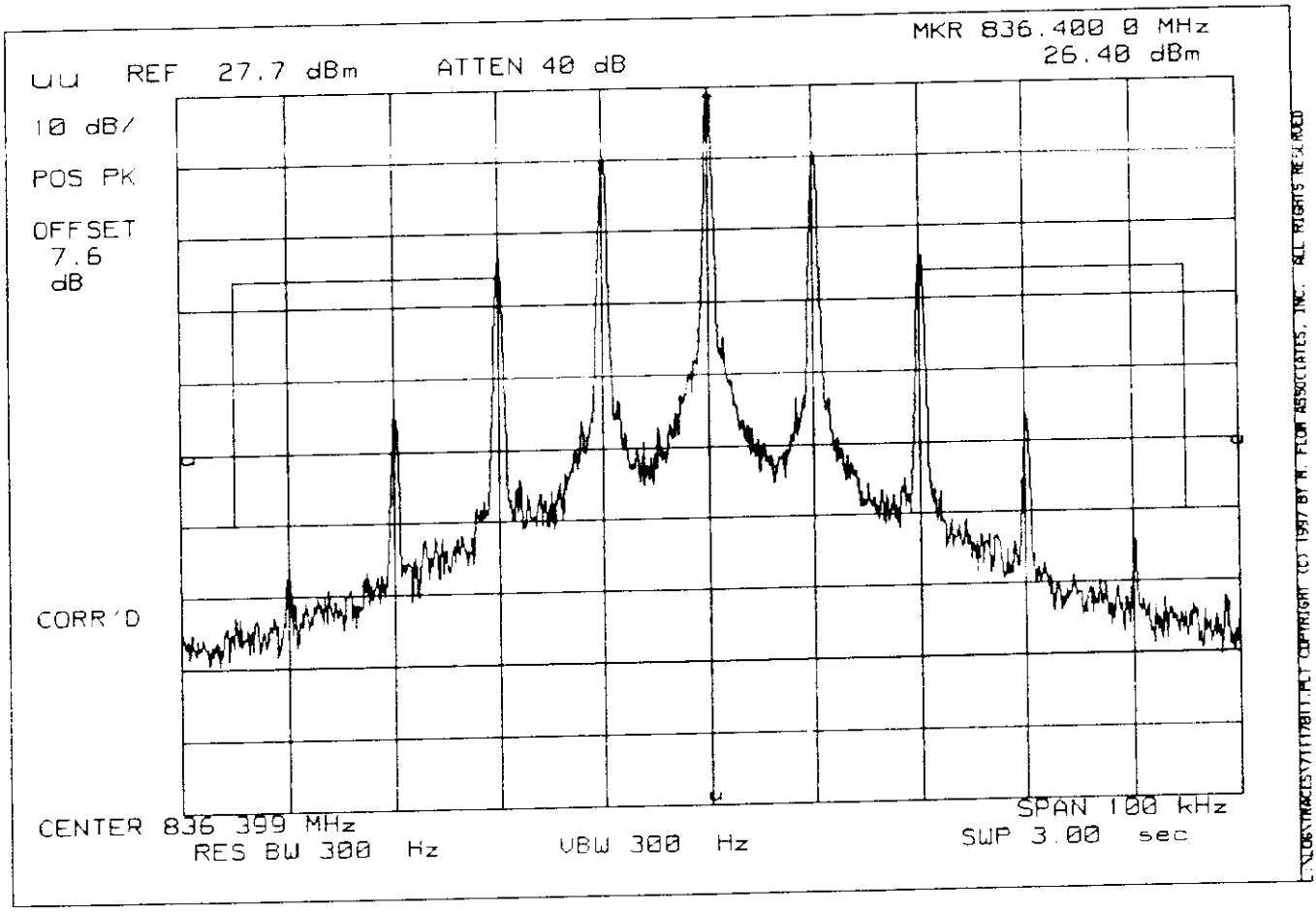
PAGE 22.12.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:25, MON

POWER: HIGH
MODULATION: SAT
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



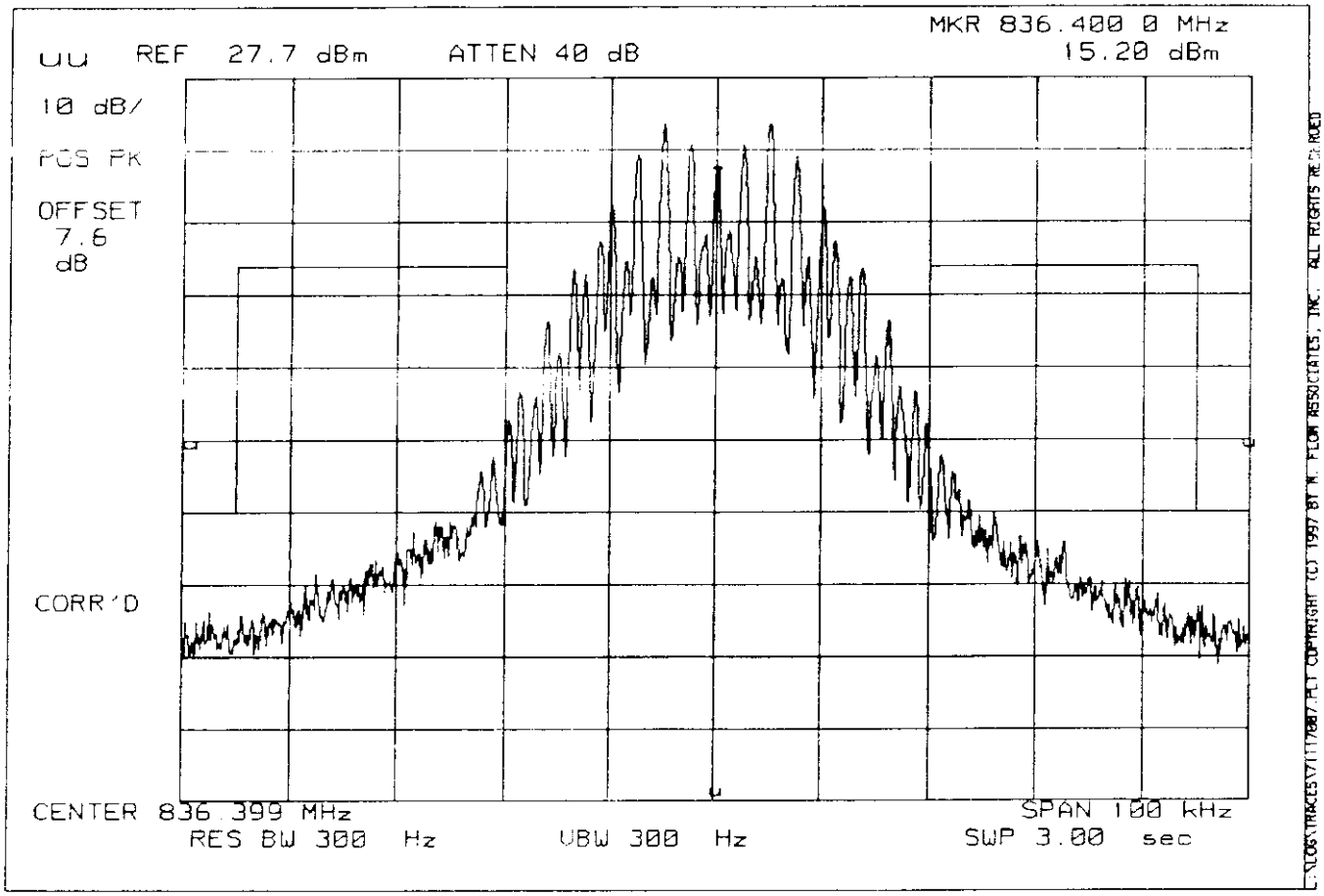
PAGE 22.13.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:30, MON

POWER: HIGH
MODULATION: ST
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



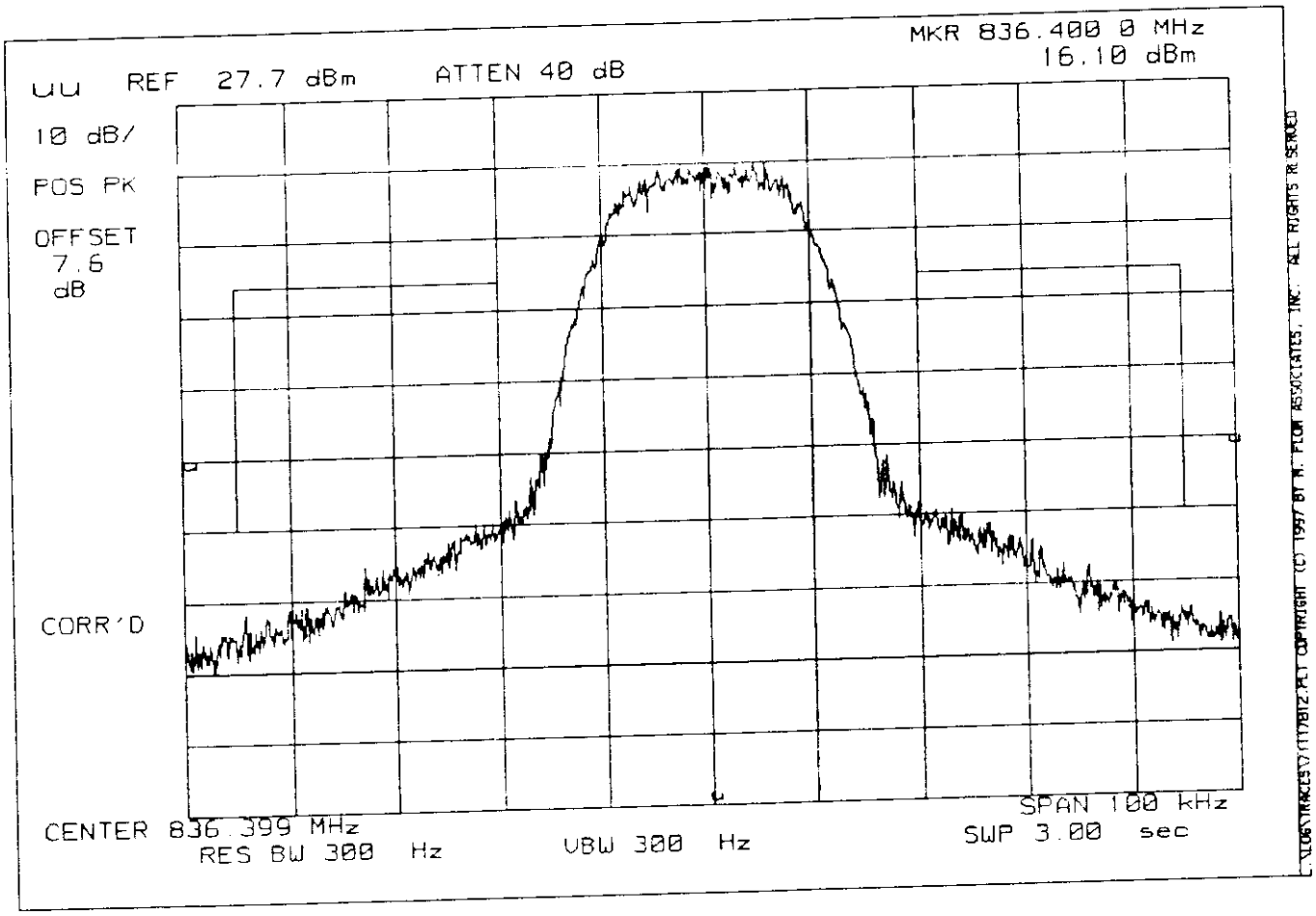
PAGE 22.14.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:23, MON

POWER: HIGH
MODULATION: VOICE + SAT
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



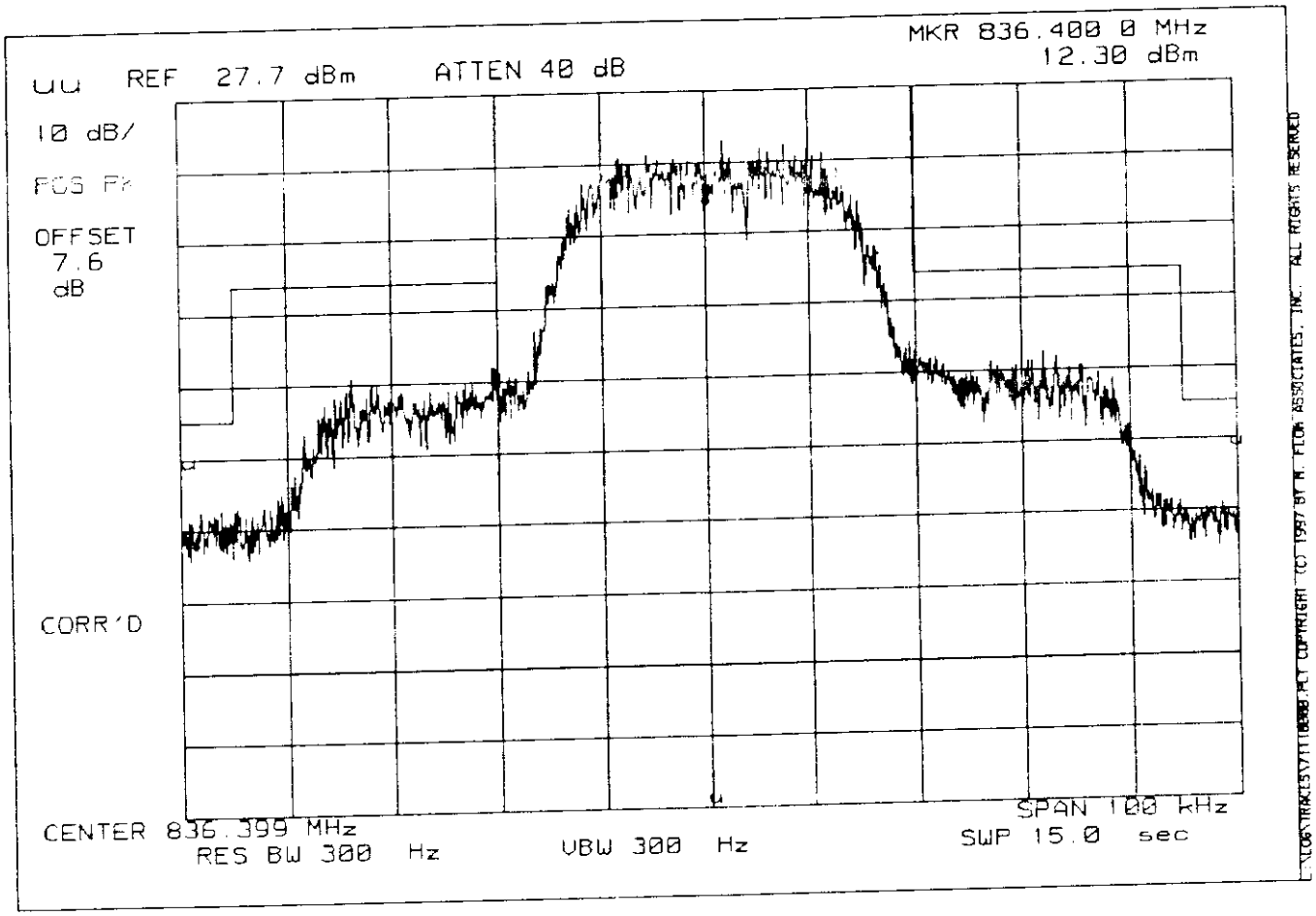
PAGE 22.15.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-17, 15:33, MON

POWER: HIGH
MODULATION: SAT+DTMF
MASK: E-AMPS CELLULAR, F3E/F3D w/LPF



PAGE 22.16.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 08:51, TUE

POWER: HIGH
MODULATION: DQPSK
MASK: E-AMPS CELLULAR, F1D, DATA



NAME OF TEST: EMISSION REQUIREMENTS - WORST CASE MODULATION & WIDEBAND DATA

PARAGRAPH: 47 CFR 22.917

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER PREVIOUS PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. was connected to a coaxial attenuator and then to a spectrum analyzer. The unmodulated carrier was set for 0 dB reference level.

2. A notch filter was introduced to reduce or eliminate any spectrum analyzer internally generated spurious for measurements of the harmonics and the carrier level.

3. Spectrum analyzer bandwidth was set to section 22.917(h) as applicable.

4. Measurements were made on channels 380, 799 and 991. The equipment was first modulated for the Worst Case Modulation, then for Wideband Data (F8W, F1D).

5. All other spurious emissions over the range of 0 to beyond the 10th harmonic (10 GHz) were 20 dB or more below the limit.

6. The data presented here is for the worst case.

7. MEASUREMENT RESULTS: ATTACHED

MEASUREMENT SUMMARY: EMISSION REQUIREMENTS - WORST CASE MODULATION

WORST CASE MODULATION = VOICE + SAT

EMISSION, MHz/HARM.	LIMIT, dBc	SPURIOUS EMISSIONS, dBc Lo	Hi
Fo + (Fo + 20 kHz) to Fo + 45 kHz	≤-26	<-48	<-52
Fo + (Fo + 45 kHz) to Fo + 90 kHz	≤-45 (≤-13 dBm)	<-69	<-73
2nd to 10th	≤-51 (≤-13 dBm)	<-67	<-65

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

EMISSIONS IN THE RECEIVER CRITICAL BAND

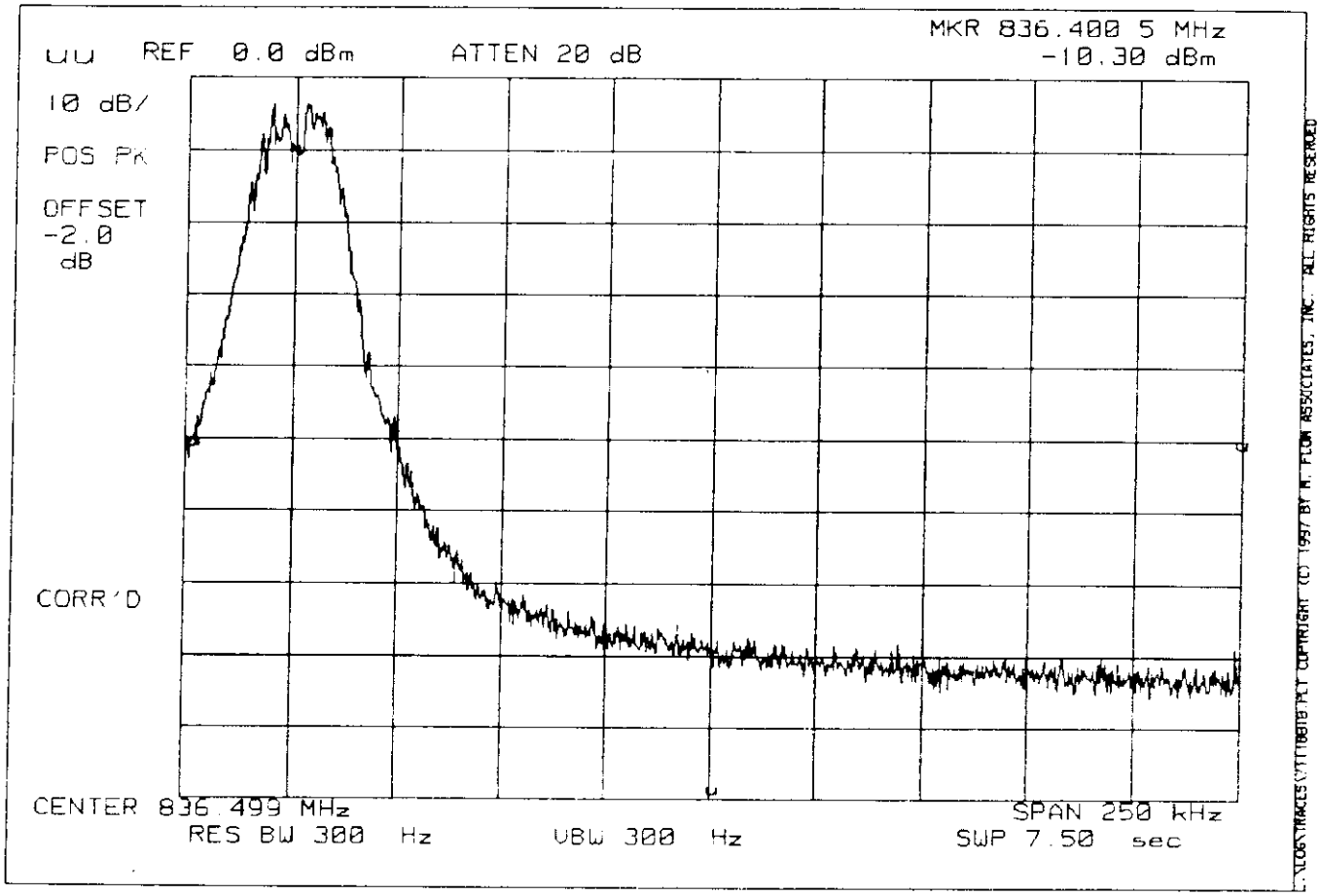
EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm Lo	Hi
869 to 894	≤-80	<-85	<-85

MEASUREMENT RESULTS = ATTACHED PLOTS

SUPERVISED BY: MORTON FLOM, P. Eng.

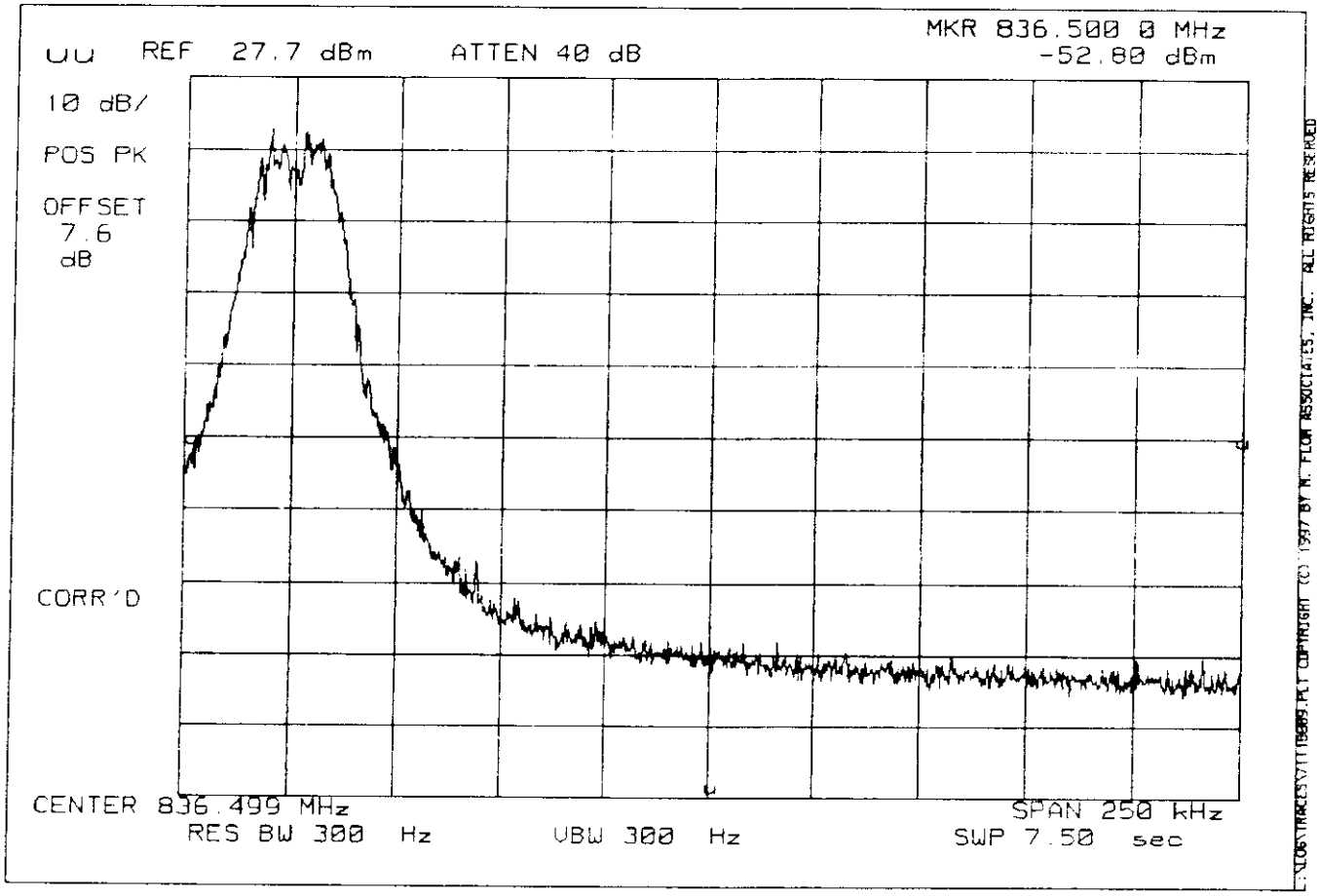
PAGE 25.1.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:23, TUE

POWER: LOW
MODULATION: VOICE
REMARK: OFFSET OCCUPIED BANDWIDTH



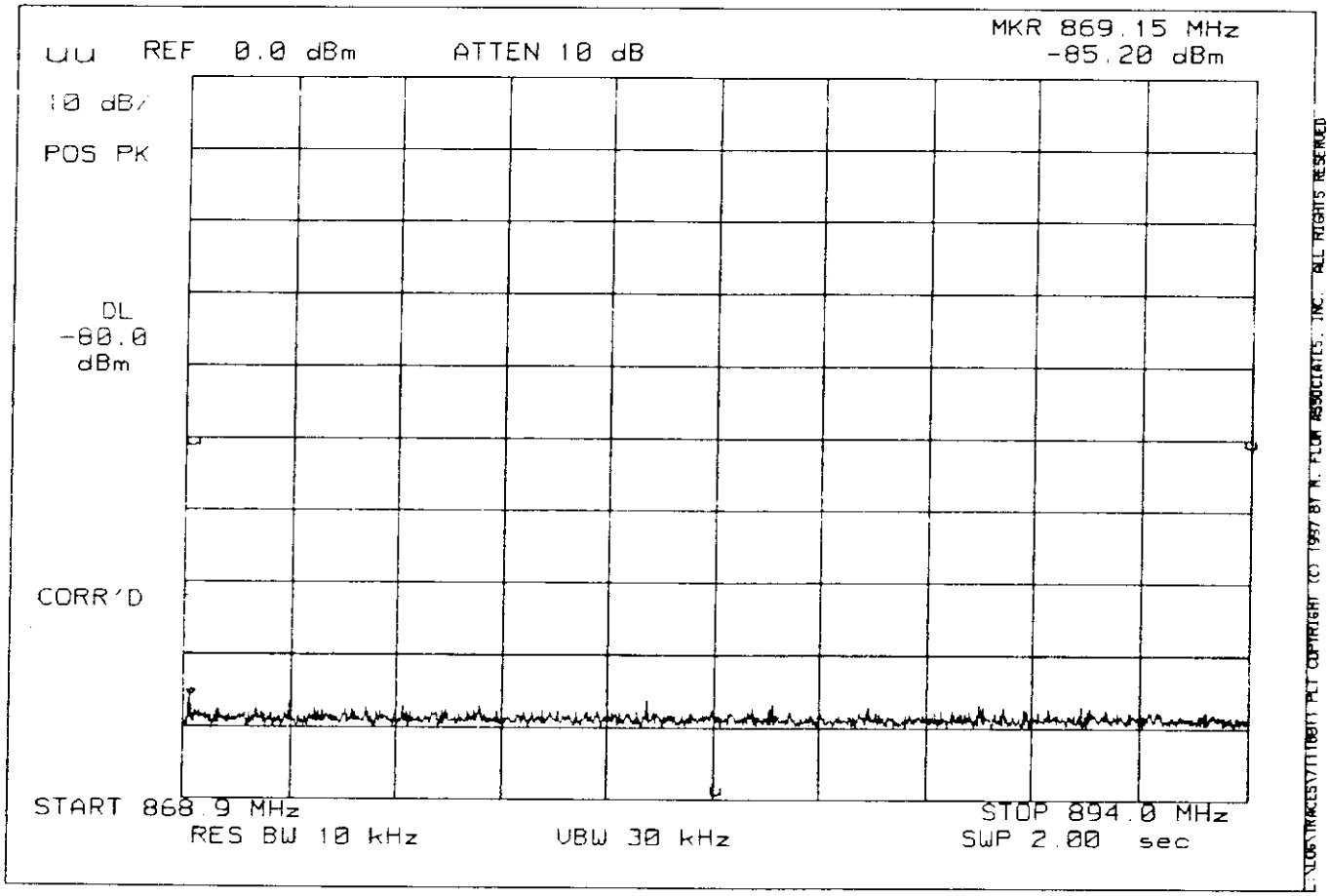
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:20, TUE

POWER: HIGH
MODULATION: VOICE
REMARK: OFFSET OCCUPIED BANDWIDTH



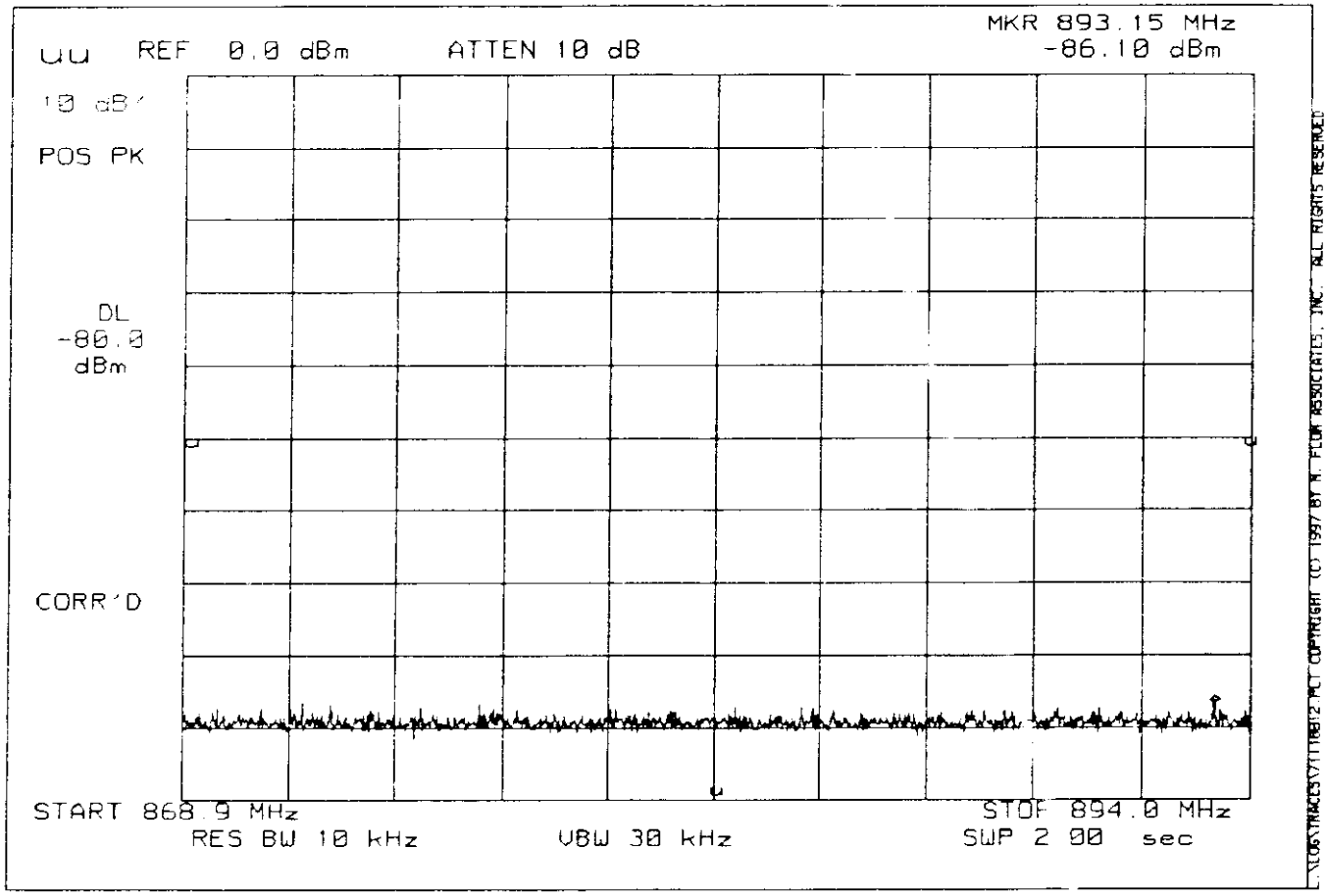
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:29, TUE

POWER: LOW
MODULATION: ANY
REMARK: TX SPURS IN RX CRITICAL BAND



SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:30, TUE

POWER: HIGH
MODULATION: ANY
REMARK: TX SPURS IN RX CRITICAL BAND



MEASUREMENT SUMMARY: EMISSION REQUIREMENTS - WIDEBAND DATA (F9D, 10 kb/s)

MEASURED CHANNELS = 380, 799, 991

EMISSION, MHz/HARM.	LIMIT, dBc	SPURIOUS EMISSIONS, dBc Lo	Hi
Fo + (Fo + 20 kHz) to Fo + 45 kHz	≤-26	<-34	<-36
Fo + (Fo + 45 kHz) to Fo + 90 kHz	≤-45	<-72	<-75
Fo + (Fo + 90 kHz) to 2nd Harmonic	≤-60 (≤-13 dBm)	<-67	<-65
2nd to 10th	≤-51 (≤-13 dBm)	<-68	<-65

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

EMISSIONS IN THE RECEIVER CRITICAL BAND

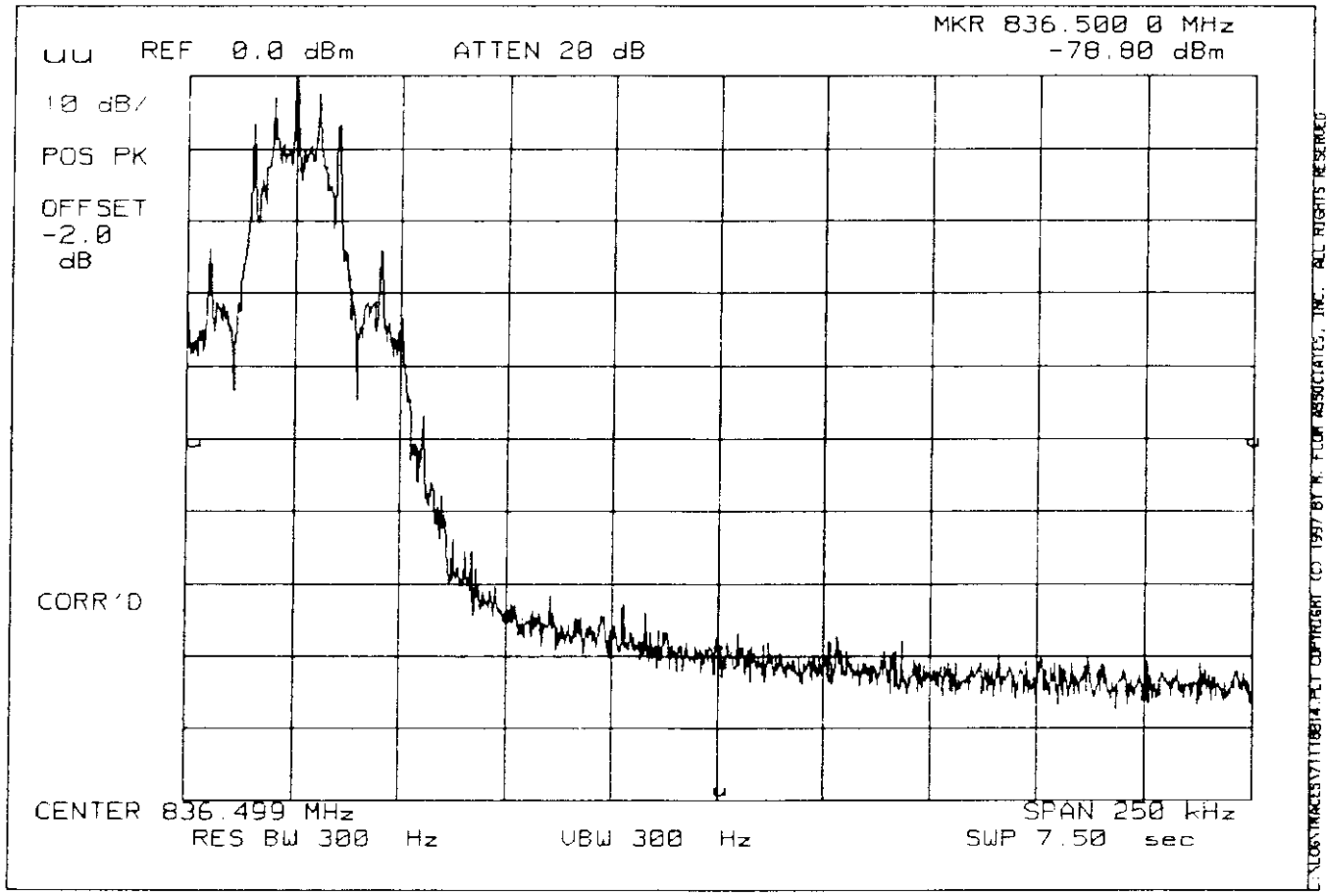
EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm Lo	Hi
869 to 894	≤-80	<-85	<-85

MEASUREMENT RESULTS = ATTACHED PLOTS

SUPERVISED BY: MORTON FLOM, P. Eng.

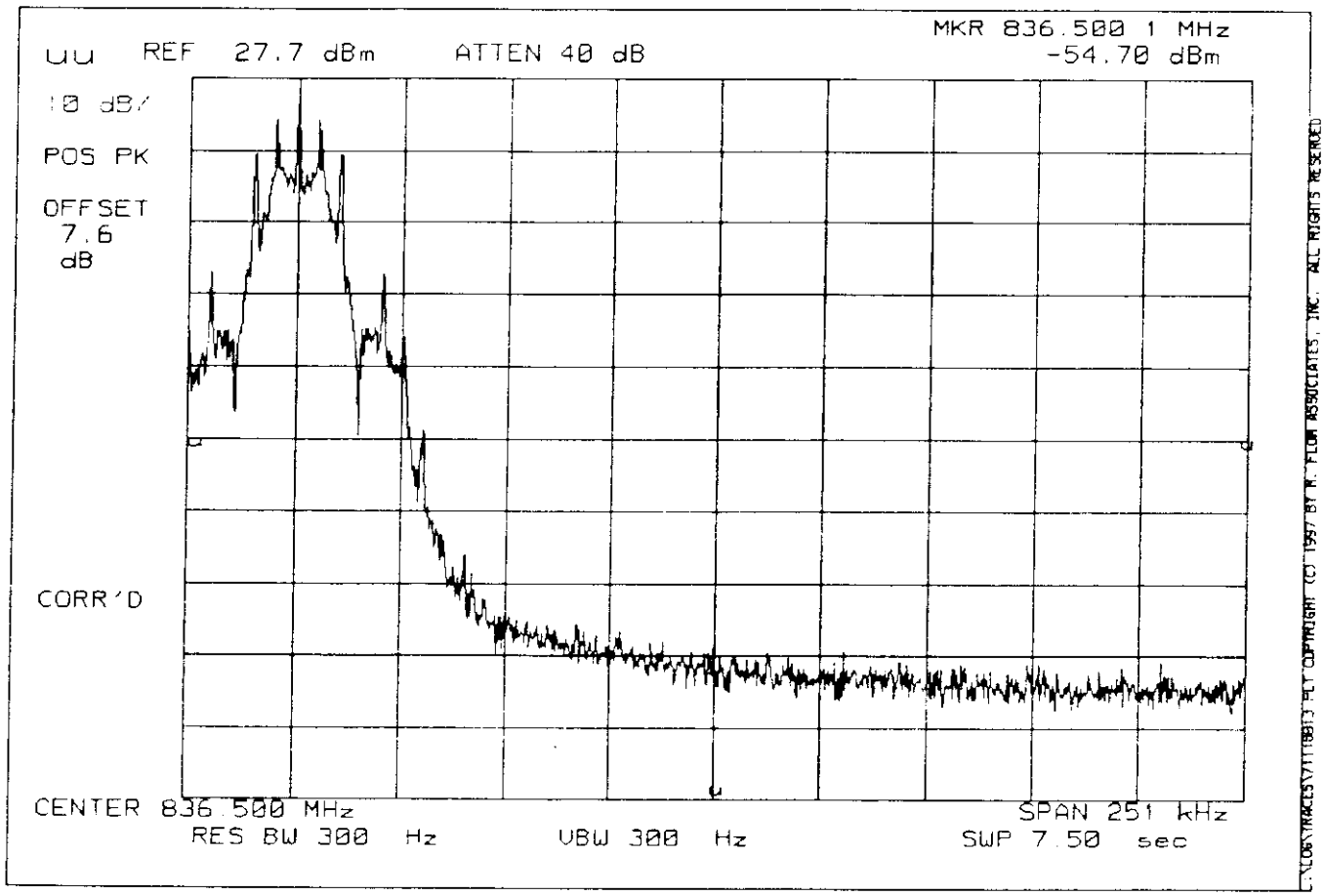
PAGE 27.1.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:35, TUE

POWER: LOW
MODULATION: WBD
REMARK: OFFSET OCCUPIED BAND WIDTH



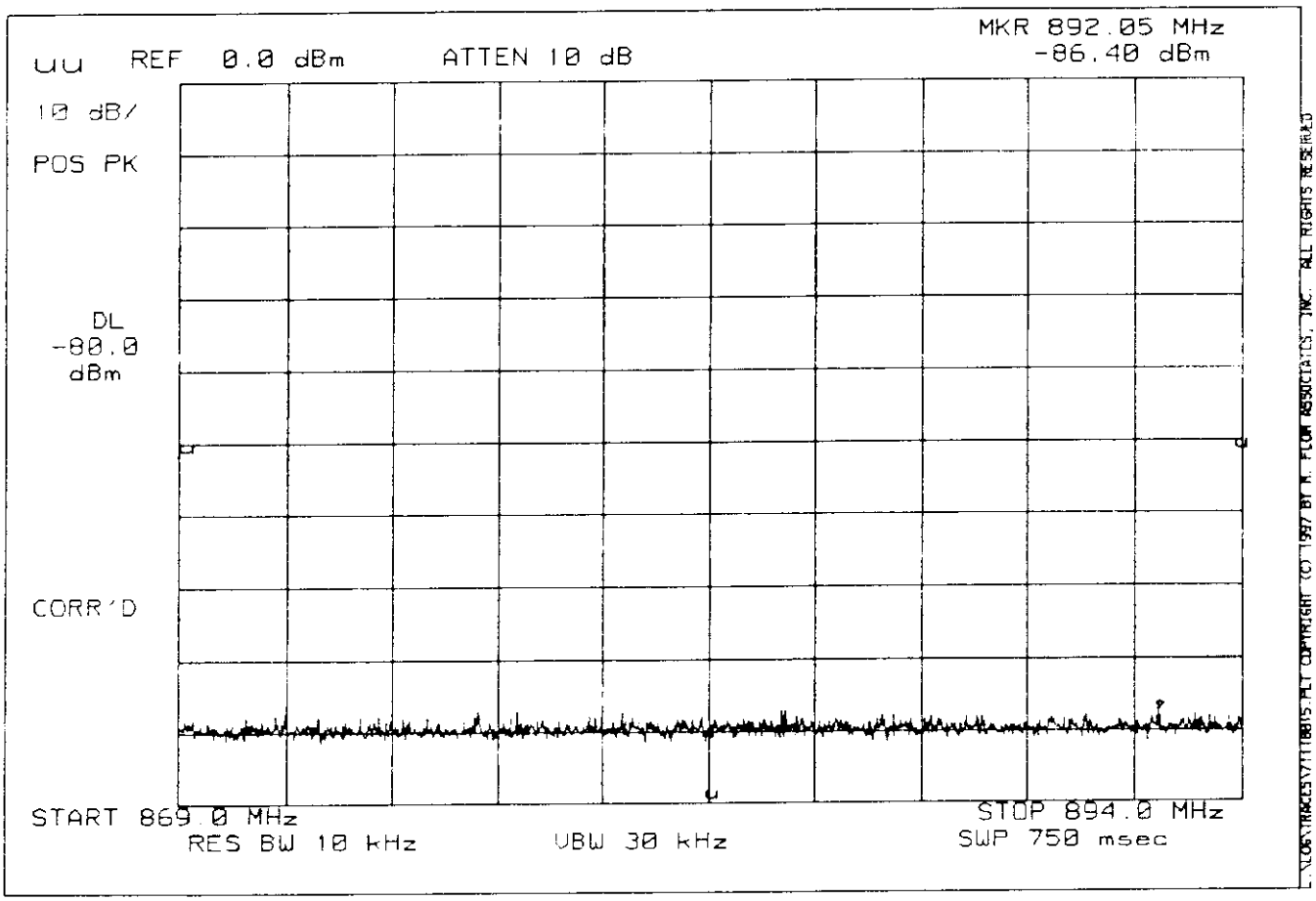
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:32, TUE

POWER: HIGH
MODULATION: WBD
REMARK: OFFSET OCCUPIED BAND WIDTH



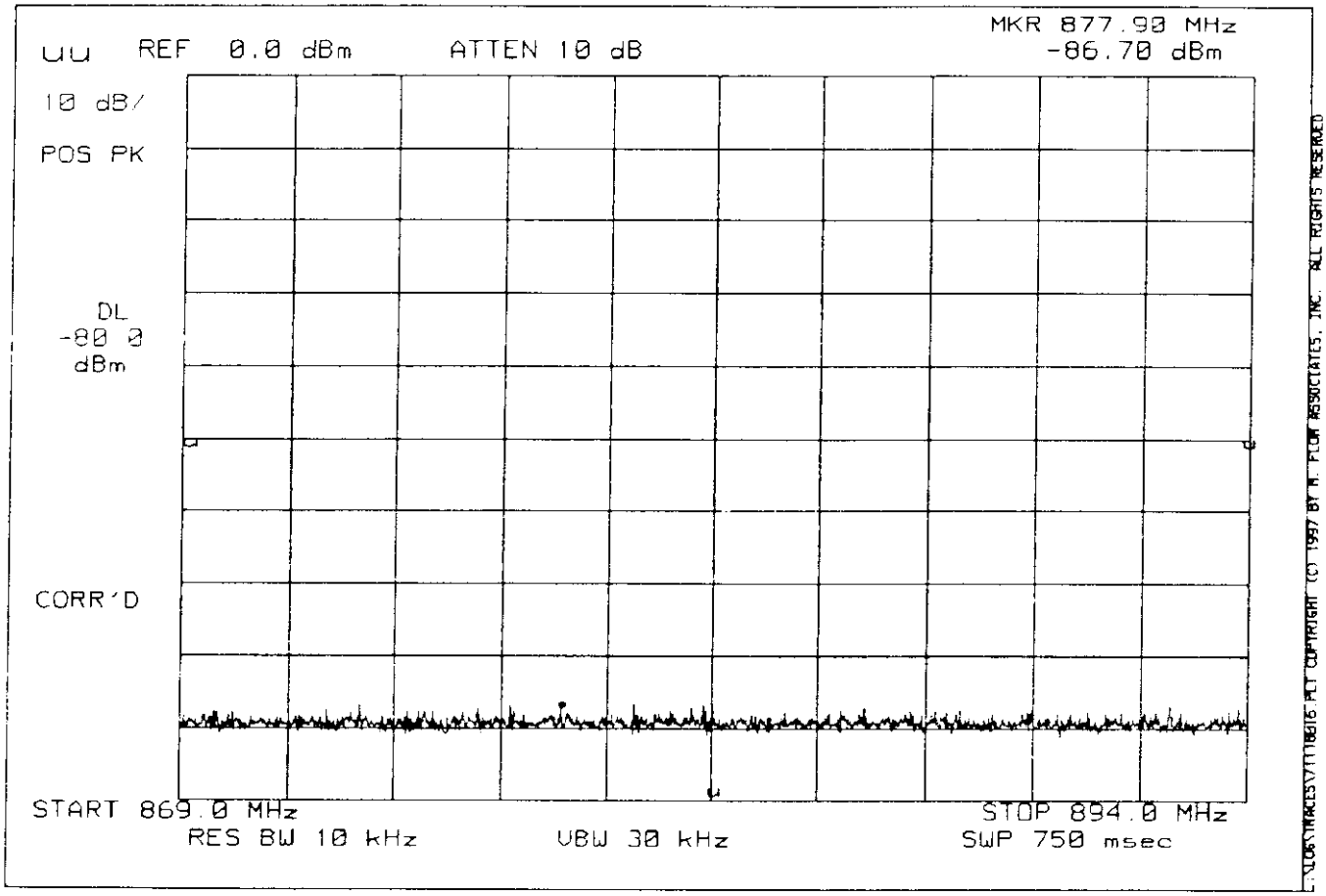
PAGE 27.3.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:37, TUE

POWER: LOW
MODULATION: ANY
REMARK: TX SPURS IN RX CRITICAL BAND



PAGE 27.4.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160
1997-NOV-18, 14:38, TUE

POWER: HIGH
MODULATION: ANY
REMARK: TX SPURS IN RX CRITICAL BAND



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

PARAGRAPH: 47 CFR 2.991, 22.917

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. was connected to a coaxial attenuator and then to a Spectrum Analyzer.

2. A notch filter was introduced to reduce or eliminate spurious emissions which could be generated internally in the spectrum analyzer.

3. Measurements were made over the range from 45 kHz to 10 GHz for the worst case modulation at both the highest and lowest R.F. power settings.

4. All other emissions were 20 dB or more below the limit.

5. Spectrum analyzer bandwidth was set to section 22.917(h) as applicable.

6. MEASUREMENT RESULTS: ATTACHED

G7BI002
TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)
LOW POWER, AMPS MODE (TX2)

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	LEVEL, µW
836.400	1672.793	-68.9	-68.9	0
836.400	2509.655	-77.9	-77.9	0
836.400	3345.658	-78.6	-78.6	0
836.400	4181.664	-78.4	-78.4	0
836.400	5018.140	-77.6	-77.6	0
836.400	5854.735	-72.2	-72.2	0
836.400	6691.576	-72.2	-72.2	0
836.400	7527.819	-72.2	-72.2	0
836.400	8363.968	-72.1	-72.1	0
836.400	9200.498	-71.4	-71.4	0
836.400	10037.019	-72.0	-72.0	0
836.400	10872.949	-71.2	-71.2	0
836.400	11709.452	-71.9	-71.9	0
836.400	12545.800	-66.6	-66.6	0

G7BI001
TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)
HIGH POWER, AMPS MODE (TX1)

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	LEVEL, µW
836.400	1672.783	-37.8	-65.5	0
836.400	2509.193	-46.0	-73.7	0
836.400	3345.575	-46.9	-74.6	0
836.400	4181.812	-48.7	-76.4	0
836.400	5018.796	-48.2	-75.9	0
836.400	5855.039	-43.2	-70.9	0
836.400	6690.874	-41.8	-69.5	0
836.400	7527.851	-41.2	-68.9	0
836.400	8363.545	-43.0	-70.7	0
836.400	9200.035	-42.4	-70.1	0
836.400	10037.102	-42.4	-70.1	0
836.400	10872.747	-42.2	-69.9	0
836.400	11709.255	-41.8	-69.5	0
836.400	12545.744	-37.6	-65.3	0

G7BI004

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)
LOW POWER, TDMA MODE (TX4)

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	LEVEL, µW
836.400	1672.798	-67.3	-67.3	0
836.400	2509.195	-77.0	-77.0	0
836.400	3345.622	-77.8	-77.8	0
836.400	4181.549	-77.8	-77.8	0
836.400	5018.366	-77.0	-77.0	0
836.400	5854.902	-71.9	-71.9	0
836.400	6690.773	-71.2	-71.2	0
836.400	7527.715	-71.1	-71.1	0
836.400	8364.175	-71.7	-71.7	0
836.400	9200.738	-71.7	-71.7	0
836.400	10037.036	-71.7	-71.7	0
836.400	10872.960	-72.1	-72.1	0
836.400	11709.269	-71.1	-71.1	0
836.400	12545.570	-67.4	-67.4	0

G7BI003

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)
HIGH POWER, TDMA MODE (TX3)

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	LEVEL, µW
836.400	1672.808	-35.1	-62.8	0
836.400	2509.633	-47.2	-74.9	0
836.400	3345.326	-48.5	-76.2	0
836.400	4182.461	-48.5	-76.2	0
836.400	5018.900	-47.8	-75.5	0
836.400	5854.959	-42.6	-70.3	0
836.400	6690.993	-42.4	-70.1	0
836.400	7528.079	-43.0	-70.7	0
836.400	8363.548	-42.3	-70.0	0
836.400	9200.526	-42.6	-70.3	0
836.400	10036.515	-42.6	-70.3	0
836.400	10873.081	-41.6	-69.3	0
836.400	11709.161	-41.3	-69.0	0
836.400	12546.496	-38.1	-65.8	0

NAME OF TEST: FIELD STRENGTH OF SPURIOUS RADIATION

PARAGRAPH: 47 CFR 2.993 (a)

GUIDE: SEE MEASUREMENT PROCEDURE BELOW

TEST CONDITIONS: S. T. & H.

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. The test sample was connected to an R.F. Wattmeter and a 50 ohm dummy load, and adjusted to its rated output.

   In order to obtain the maximum response at each spurious frequency, the turntable was rotated. Also, the Search Antennas were raised and lowered vertically, and all cables were oriented. Excess power lead was coiled near the power supply.

4. A signal generator, connected with a non-radiating cable to a vertically polarized half-wave antenna (for each frequency involved) was substituted for the transmitter. The Search Antenna was raised and lowered to obtain maximum indicated.

5. The signal generator output was adjusted until a signal level indication equal to that from the transmitter was obtained.

6. Steps 4 and 5 were repeated, using a horizontally polarized half-wave antenna. The higher of the two observations was noted.

7. Power into the half-wave antenna was calculated from the characteristic impedance of the line, and the voltage output from the signal generator.

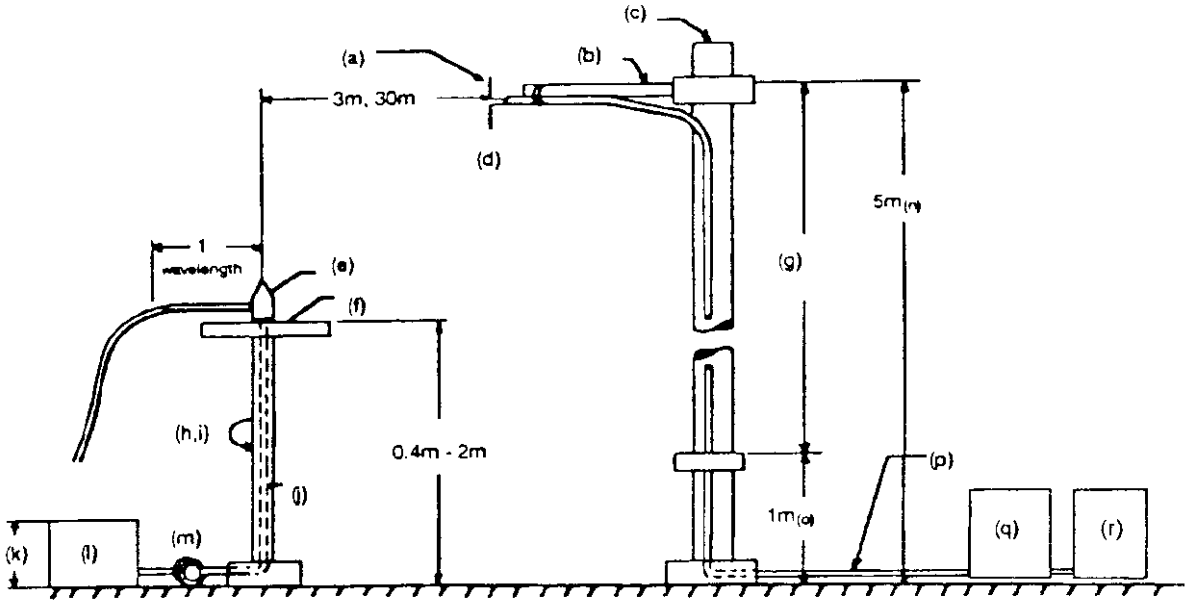
8. The level of each spurious radiation with reference to the transmitter power in dB, was calculated from:

$$\text{SPURIOUS LEVEL, dB} = 10 \text{ LOG } \frac{\text{(Calculated Spurious Power) [from Para. 7].}}{\text{Tx Power (Wattmeter)}}$$

9. The worst case for all channels is shown.

10. MEASUREMENT RESULTS: ATTACHED

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 10 m in length.
(q) Amplifier (optional).
(r) Spectrum Analyzer.

RADIATED SPURIOUS EMISSIONS (TX2), LOW POWER, AMPS
1997-NOV-17, 14:03, MON

TUNED, MHz	EMISSION, MHz	METER, dBuV	C.F., dB	µV/m @ 3m

ALL EMISSIONS WERE 20 dB OR MORE BELOW THE LIMIT

RADIATED SPURIOUS EMISSIONS (TX1), HIGH POWER, AMPS
1997-NOV-17, 11:13, MON

TUNED, MHz	EMISSION, MHz	METER, dBuV	C.F., dB	µV/m @ 3m
FUNDAMENTAL:				
836.400	836.40			6×10^6
SPURIOUS:				
836.400	1672.70	24.5	33.1	757
836.400	2509.19	25.3	34.9	1022
836.400	3345.59	25.5	38.1	1508
836.400	4181.99	18.3	39.9	810
836.400	5018.40	9.4	41.6	358
836.400	5854.80	8.5	43.6	404
836.400	6691.22	35.3	14.6	312
836.400	7527.64	25.0	16.6	120
836.400	8363.98	32.0	17.5	299

ALL OTHER EMISSIONS WERE 20 dB OR MORE BELOW THE LIMIT

RADIATED SPURIOUS EMISSIONS (TX4), LOW POWER, TDMA MODE
1997-NOV-18, 10:01, TUE

TUNED, MHz	EMISSION, MHz	METER, dBuV	C.F., dB	µV/m @ 3m

ALL EMISSIONS WERE 20 dB OR MORE BELOW THE LIMIT

RADIATED SPURIOUS EMISSIONS (TX3), HIGH POWER, TDMA MODE
1997-NOV-18, 08:39, TUE

TUNED, MHz	EMISSION, MHz	METER, dBuV	C.F., dB	µV/m @ 3m
FUNDAMENTAL:				
836.400	836.40			7×10^6
SPURIOUS:				
836.400	1672.70	27.5	33.1	1074
836.400	2509.22	19.9	34.9	546
836.400	3345.60	12.0	38.1	318
836.400	4182.01	10.2	39.9	320
836.400	5018.43	10.9	41.6	422
836.400	5854.81	10.3	43.6	494
836.400	6691.23	40.7	14.6	577
836.400	7527.65	40.3	16.6	698
836.400	8364.05	41.2	17.5	859

ALL OTHER EMISSIONS WERE 20 dB OR MORE BELOW THE LIMIT

NAME OF TEST: FREQUENCY STABILITY - TEMPERATURE VARIATION

PARAGRAPH: 47 CFR 2.995 (a)(1)

GUIDE: TIA/EIA STANDARD IS-19-B

TEST CONDITIONS: AS INDICATED

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. 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.

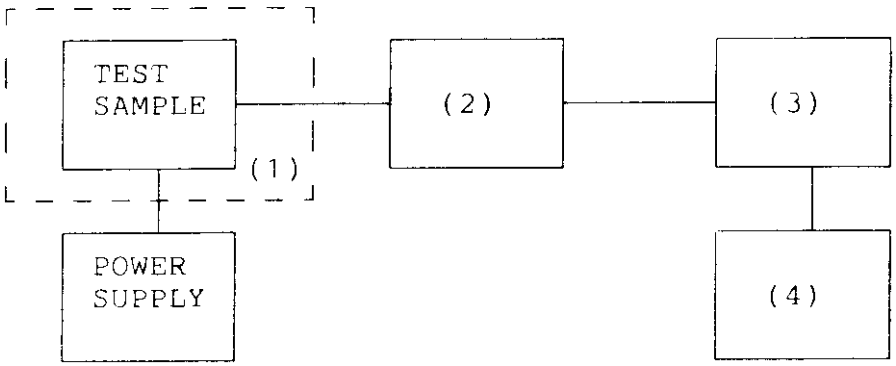
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

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

TENNEY TEMPERATURE CHAMBER	x
WEBER HUMIDITY CHAMBER	
L.A.B. RVH 18-100	

(2) COAXIAL ATTENUATOR

NARDA 766-10	x
SIERRA 661A-30	
BIRD 8329 (30 dB)	

(3) R.F. POWER

HP 435A POWER METER	
HP 436A POWER METER	x
HP 8901A POWER MODE	x

(4) FREQUENCY COUNTER

HP 5383A	
HP 5334B	
HP 8901A	x

NAME OF TEST: FREQUENCY STABILITY - TEMPERATURE VARIATION
LIMIT = 2.5 ppm (2091 Hz)

AMPS MODE

TEMPERATURE, °C	CHANGE IN FREQUENCY	
	Hz	ppm
-30	-418	-0.5
-20	84	0.1
-10	84	0.1
0	84	0.1
10	0	0.0
20	0	0.0
25	0	0.0
30	84	0.1
40	0	0.0
50	0	0.0
60	-418	-0.5

TDMA MODE

TEMPERATURE, °C	CHANGE IN FREQUENCY	
	Hz	ppm
-30	22.66	0.0
-20	14.12	0.0
-10	9.77	0.0
0	-3.95	0.0
10	6.65	0.0
20	8.28	0.0
25	-4.73	0.0
30	1.99	0.0
40	12.20	0.0
50	15.26	0.0
60	19.19	0.0

NAME OF TEST: FREQUENCY STABILITY - VOLTAGE VARIATION

PARAGRAPH: 47 CFR 2.995 (b)(1)

GUIDE: SEE MEASUREMENT PROCEDURE BELOW

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER PREVIOUS PAGE

MEASUREMENT PROCEDURE

1. The E.U.T. 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 E.U.T. was varied from 85% to 115% of the nominal value measured at the input to the E.U.T.
3. The variation in frequency was measured for the worst case.

MEASUREMENT RESULTS

LIMIT, ppm = 2.5
LIMIT, Hz = 2091

STV, %	Vdc	CHANGE IN FREQUENCY, Hz	
		Hz	ppm
AMPS MODE:			
85	3.3	0	0.0
100	3.9	0	0.0
115	4.5	-84	-0.1
BATTERY END POINT:	3.2	0	0.0
TDMA MODE:			
85	3.3	1.21	0.0
100	3.9	-4.73	0.0
115	4.5	22.30	0.0
BATTERY END POINT:	3.2	1.21	0.0

SUPERVISED BY: MORTON FLOM, P. Eng.

PLEASE NOTE:

THE EUT IS A DUAL-MODE / DUAL-BAND DEVICE.

THE FOLLOWING PAGES PRESENT THE DATA RECORDED WHILE THE EUT IS OPERATING UNDER PART 24 OF THE RULES.

NAME OF TEST: R. F. POWER OUTPUT

PARAGRAPH: 47 CFR 2.985 (a), 24.232(b)

GUIDE: TIA/EIA IS-95

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

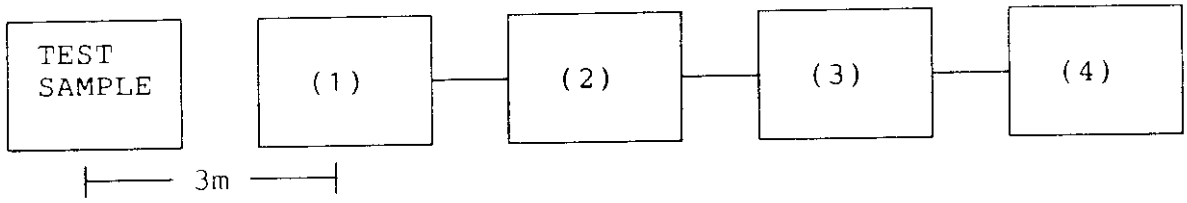
1. The EUT was placed on an open-field site and its radiated field strength at a known distance was measured by means of a spectrum analyzer. Equivalent loading of a dipole was calculated from the equation $P_t=((E \times R)^2/49.2)$ watts, where R = 3m.
2. Measurement accuracy is ±1.5 dB.

MEASUREMENT RESULTS

NOMINAL, MHz	Watts
POWER SETTING: Low	
1851.00	0.0052
1880.00	0.0052
1908.75	0.0052
POWER SETTING: High	
1851.00	0.617
1880.00	0.617
1908.75	0.617

SUPERVISED BY: MORTON FLOM, P. Eng.

TRANSMITTER RADIATED MEASUREMENTS



(1) TRANSDUCER

EMCO 3115	x
APELCO 2001 LOG PERIODIC	x
_____	___

(2) HIGH PASS FILTER

NARDA μPAD (IN-BAND ONLY)	x
TRILITHIC (OUT-OF-BAND ONLY)	x
_____	___

(3) PREAMP

HP 8449 (+30 dB) (OUT-OF-BAND ONLY)	x
_____	___

(4) SPECTRUM ANALYZER

HP 8566B	___
HP 8563E	x
_____	___

TRANSMITTER CONDUCTED MEASUREMENTS

NAME OF TEST(S): 2.991: Unwanted (Spurious) Emissions
2.989(c), 24.238(b): Occupied Bandwidth
24: Emissions at Band Edges

GUIDE(S): TIA/EIA IS-95

TEST CONDITIONS: S. T. & H.

TEST EQUIPMENT: AS PER ATTACHED PAGE

MEASUREMENT PROCEDURE

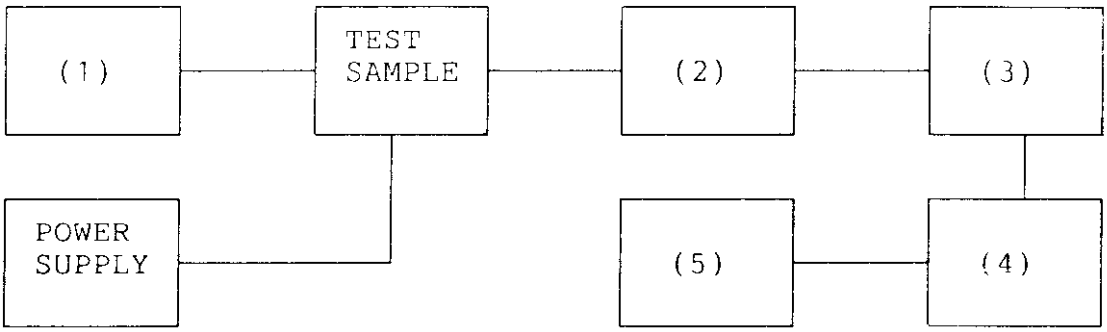
1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected.

2. The low and high channels for all RF powers within the designated frequency block(s) were measured.

3. MEASUREMENT RESULTS: ATTACHED

TRANSMITTER CONDUCTED MEASUREMENTS

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



(1) AUDIO OSCILLATOR/GENERATOR

HP 204D	___
HP 8903A	___
HP 3312A	___
NONE (INTERNAL MODULATION)	x
_____	___

(2) COAXIAL ATTENUATOR

NARDA 766-10	___
SIERRA 661A-30	___
BIRD 8329 (30 dB)	___
NONE	x
_____	___

(3) FILTERS; NOTCH, HP, LP, BP

CIRQTEL FHT	___
EAGLE TNF-1	___
PHELPS DODGE PD-495-8	___
NONE	x
_____	___

(4) SPECTRUM ANALYZER

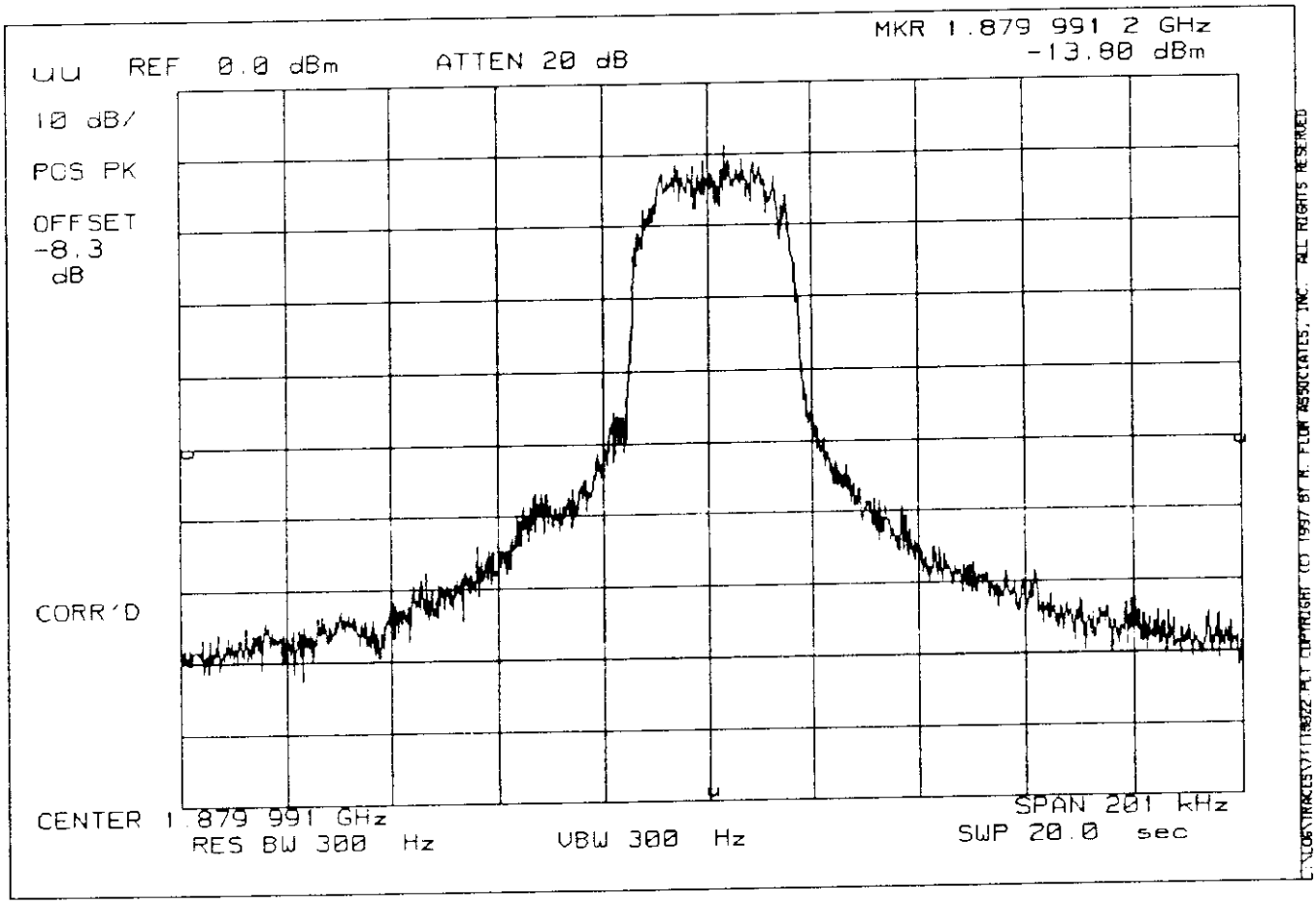
HP 8566B	___
HP 8563E	x
_____	___

(5) SCOPE

HP 1741A	___
HP 181T	___
TEK 935	___
NONE	x
_____	___

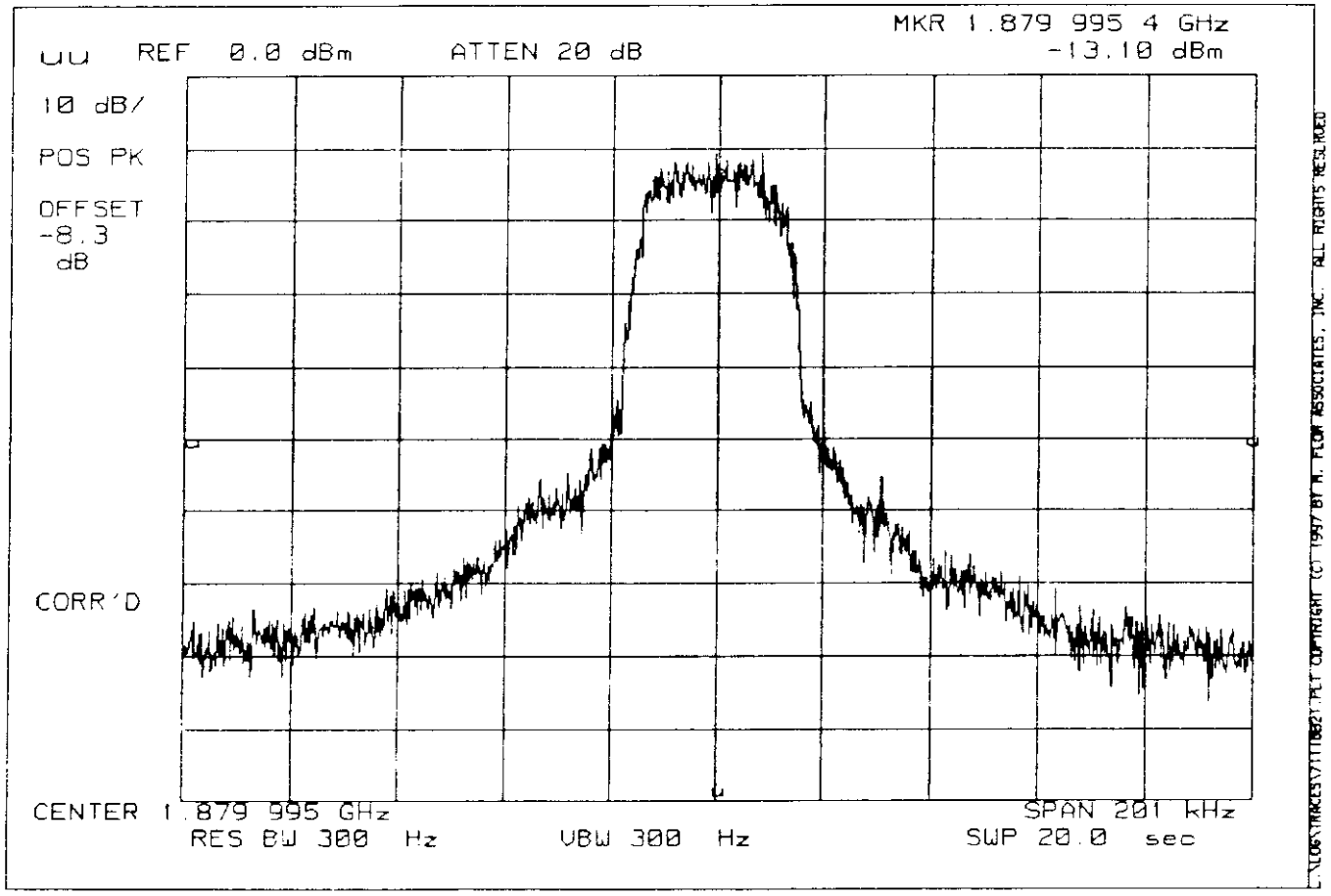
PAGE 43.1.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-18, 16:08, TUE

POWER: LOW
MODULATION: DQPSK



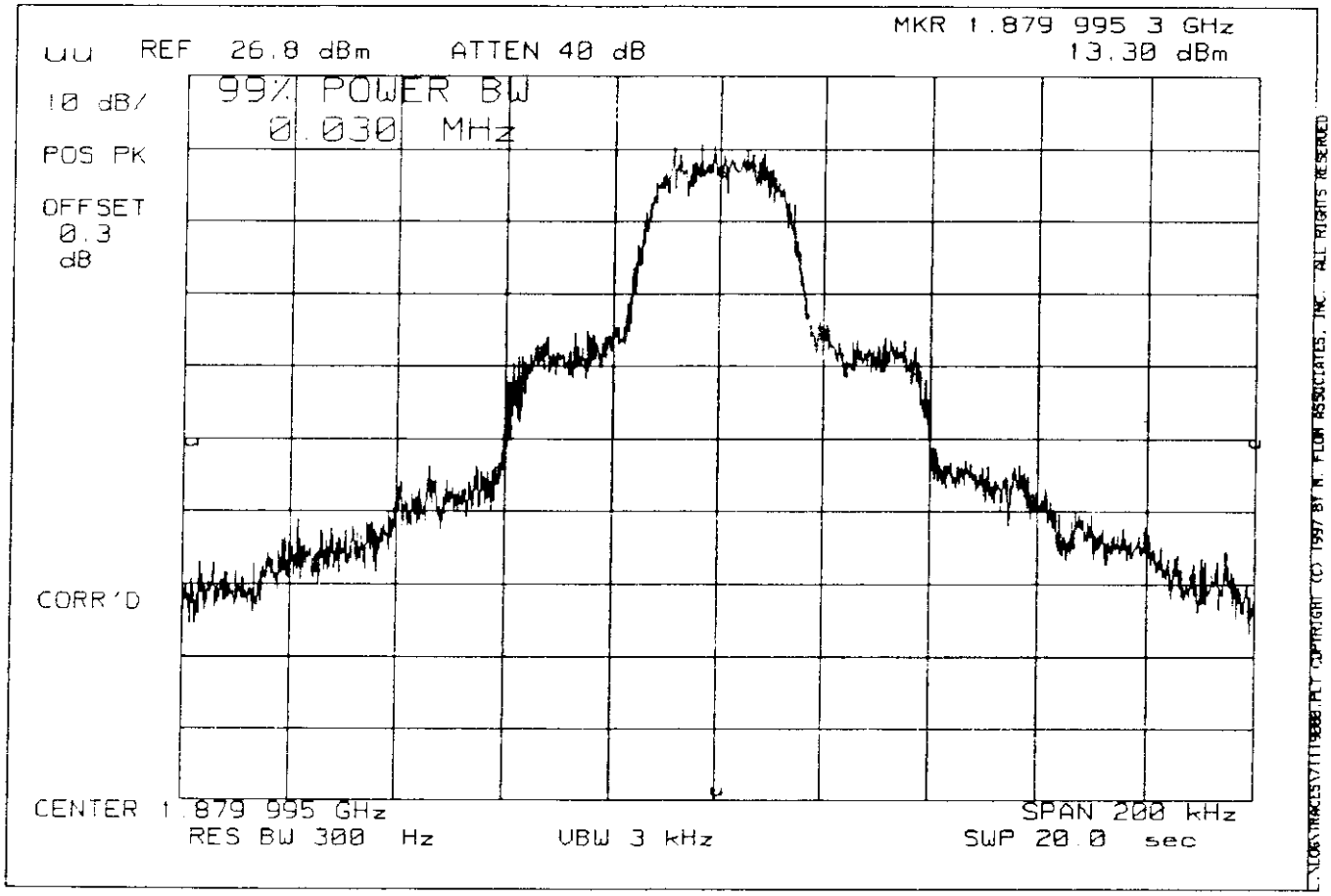
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-18, 16:04, TUE

POWER: HIGH
MODULATION: DQPSK



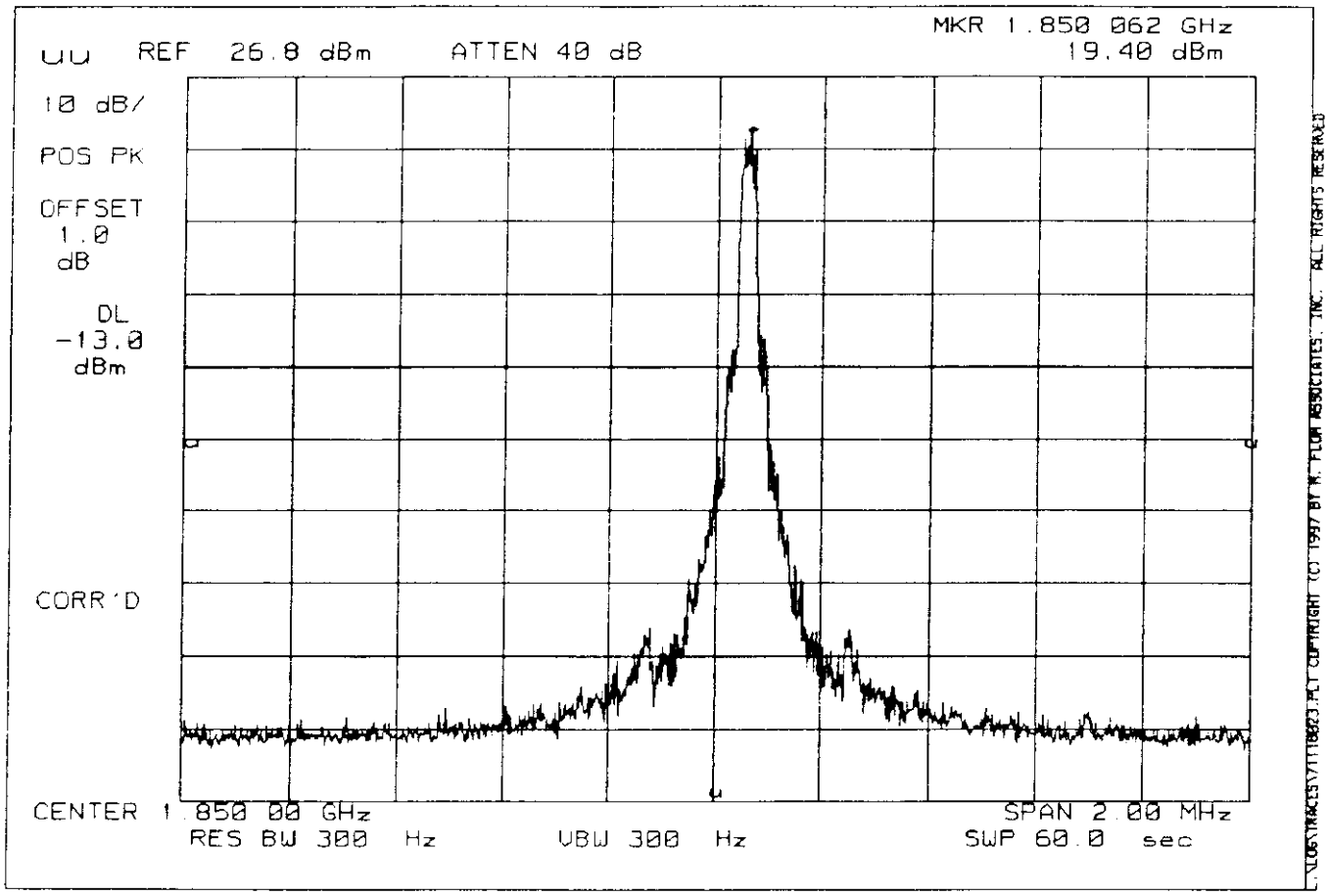
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-19, 09:27, WED

POWER: HIGH
MODULATION: DQPSK
REMARK: 99 % POWER BANDWIDTH



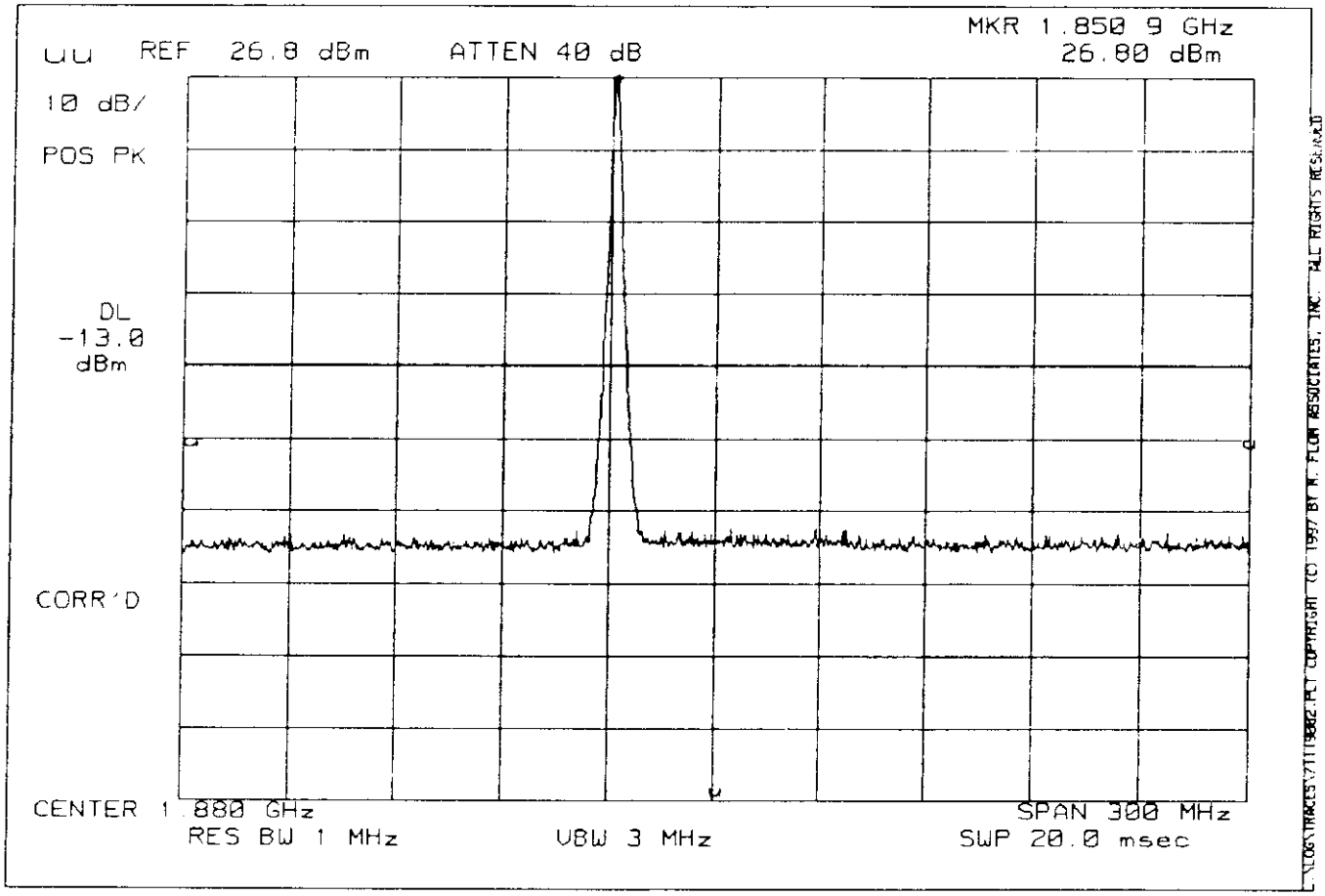
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-18, 16:39, TUE

POWER: HIGH
MODULATION: DQPSK
REMARK: LOWER BANDEDGE



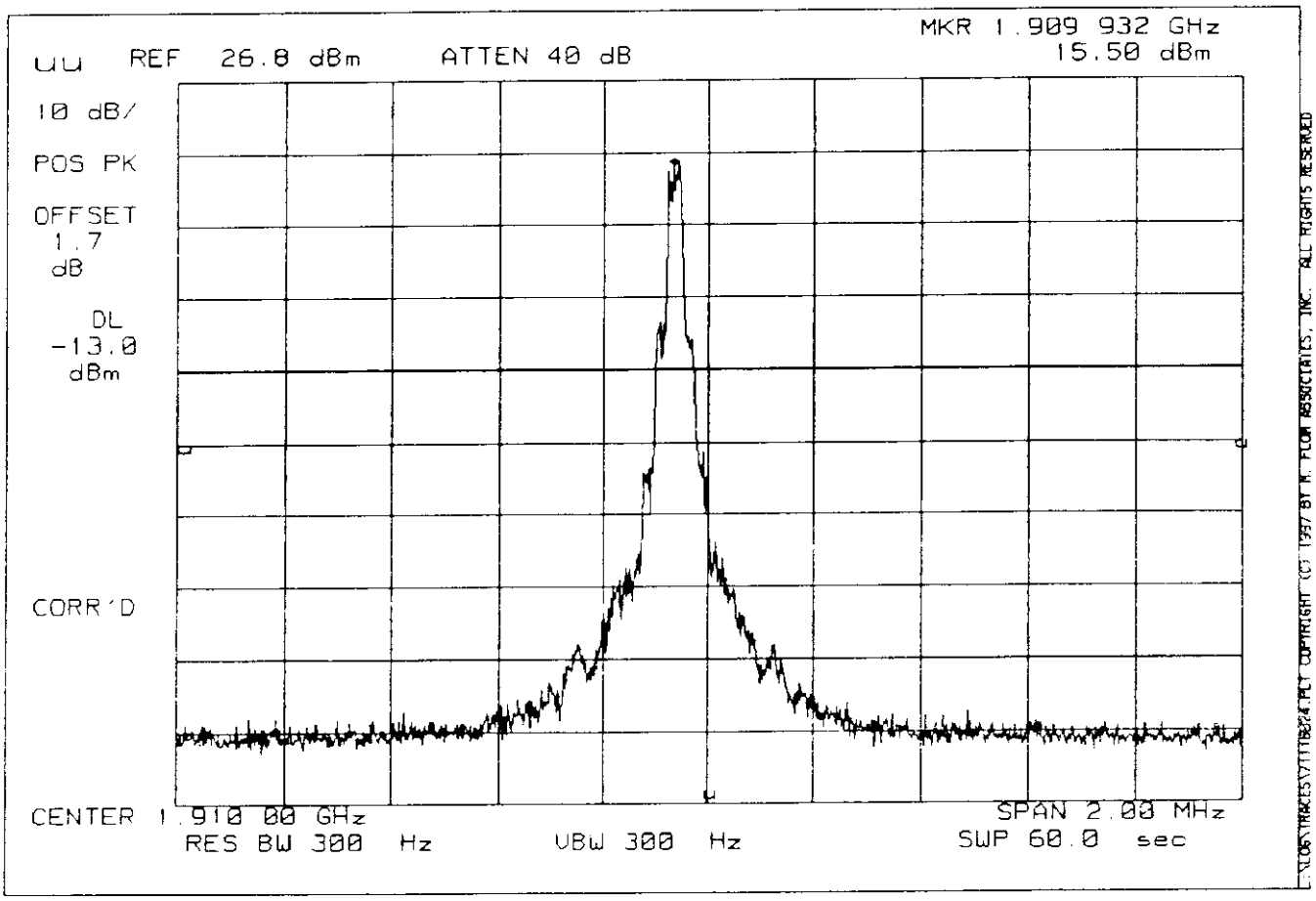
PAGE 43.5.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-19, 10:36, WED

POWER: HIGH
MODULATION: DQPSK
REMARK: LOWER BANDEDGE (RBW) 1 MHZ



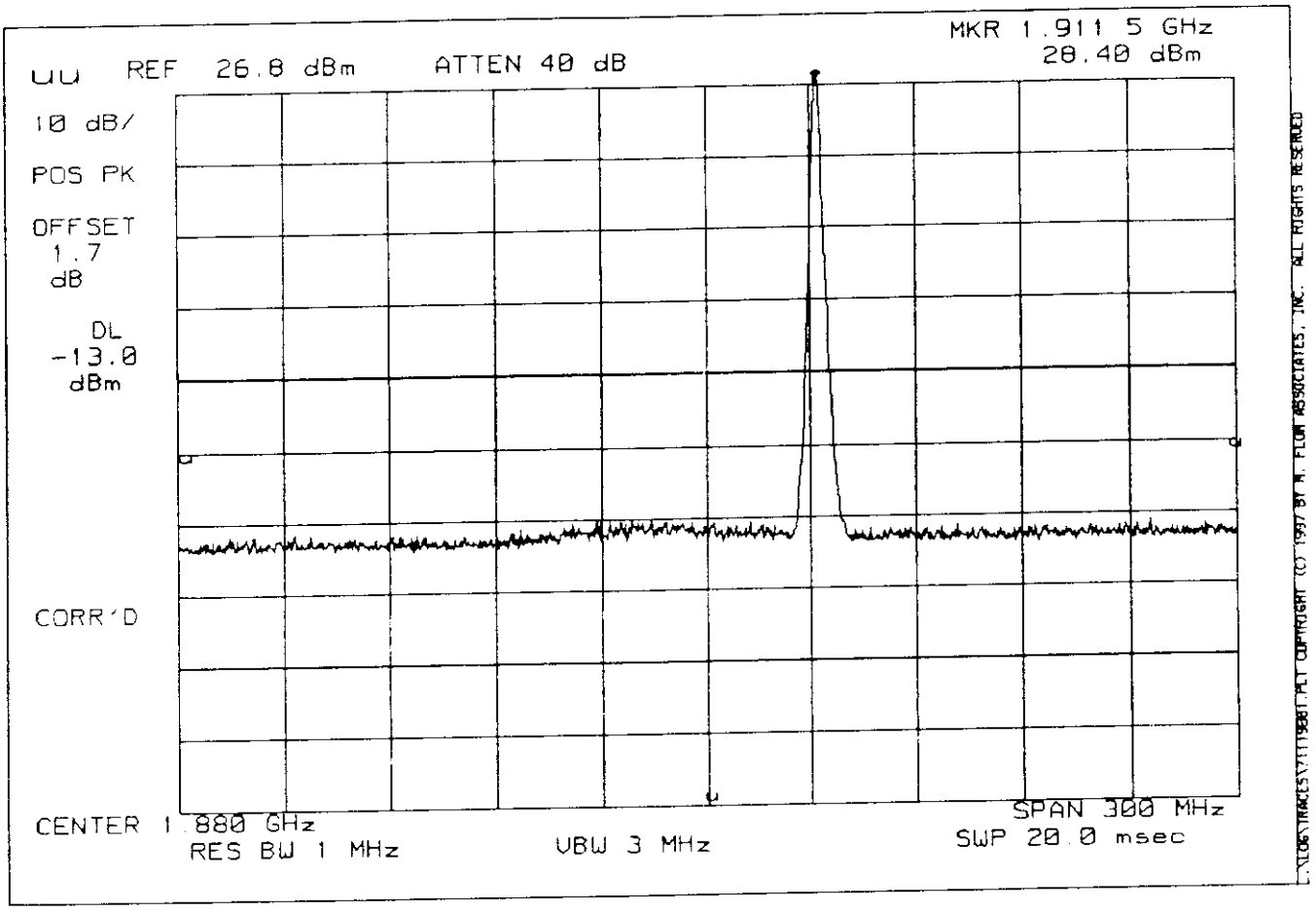
PAGE 43.6.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-18, 16:49, TUE

POWER: HIGH
MODULATION: DQPSK
REMARK: UPPER BANDEDGE



PAGE 43.7.
SPECTRUM ANALYZER PRESENTATION
NOKIA, 6160 (PCS)
1997-NOV-19, 10:33, WED

POWER: HIGH
MODULATION: DQPSK
REMARK: UPPER BANDEDGE (RBW) 1 MHZ



TRANSMITTER RADIATED MEASUREMENTS

NAME OF TEST: 2.993(a), 24.238: Field Strength of Spurious 24: Emissions at Band Edges

GUIDE: SEE MEASUREMENT PROCEDURE BELOW

TEST CONDITIONS: S. T. & H.

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 one (1), three (3), or thirty meters away from the search antenna. The test sample was connected to an R.F. Wattmeter and a 50 ohm dummy load, and adjusted to its rated output.

   In order to obtain the maximum response at each spurious frequency, the turntable was rotated. Also, the Search Antennas were raised and lowered vertically, and all cables were oriented. Excess power lead was coiled near the power supply.

4. A vertically polarized search antenna was connected to the spectrum analyzer. The search antenna was raise and lowered to obtain the maximum indicated.

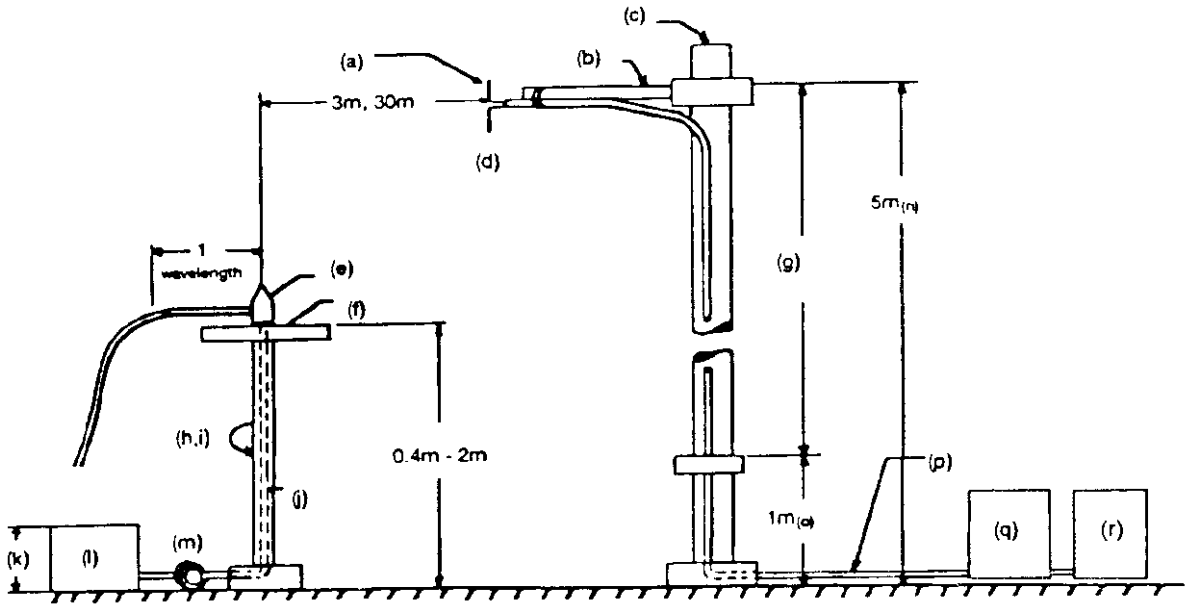
5. Step 4 was repeated, using a horizontally polarized search antenna.

6. The power level(s) were recorded.

7. The worst case for all channels is shown.

8. Measurement results: ATTACHED

RADIATED MEASUREMENTS



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 10 m in length.
(q) Amplifier (optional).
(r) Spectrum Analyzer.

RADIATED SPURIOUS EMISSIONS (TX6), LOW POWER, PCS MODE
1997-NOV-18, 15:23, TUE

TUNED, MHz	EMISSION, MHz	METER, dBuV	C.F., dB	µV/m @ 3m

ALL SPURIOUS EMISSIONS WERE 20 dB OR MORE BELOW THE LIMIT

RADIATED SPURIOUS EMISSIONS (TX5), HIGH POWER, PCS MODE

1997-NOV-18, 15:05, TUE

TUNED, MHz	EMISSION, MHz	METER, dBuV	C.F., dB	µV/m @ 3m
FUNDAMENTAL:				
836.400	836.40			5.5×10^6
SPURIOUS:				
1879.980	3760.03	30.2	39.4	3027
1879.980	5640.02	22.7	43.2	1972
1879.980	7520.04	41.0	16.5	753
1879.980	9400.04	38.5	18.6	714
1879.980	11280.04	37.5	20.2	771
1879.980	13160.05	36.8	21.8	857
1879.980	15040.03	38.7	22.8	1186
1879.980	16920.05	37.8	24.9	1363

ALL OTHER SPURIOUS EMISSIONS WERE 20 dB OR MORE BELOW THE LIMIT

NAME OF TEST: FREQUENCY STABILITY - TEMPERATURE VARIATION

PARAGRAPH: 47 CFR 2.995 (a)(1), 24.235

GUIDE: TIA/EIA IS-95

TEST CONDITIONS: AS INDICATED

TEST EQUIPMENT: AS PER ATTACHED 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.

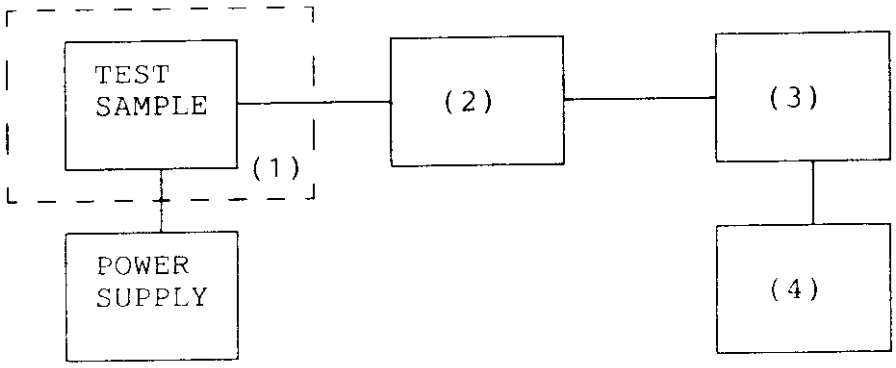
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

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

TENNEY TEMPERATURE CHAMBER	x
WEBER HUMIDITY CHAMBER	
L.A.B. RVH 18-100	

(2) COAXIAL ATTENUATOR

NARDA 766-10	
SIERRA 661A-30	
BIRD 8329 (30 dB)	
NONE	x

(3) R.F. POWER

HP 435A POWER METER	
HP 436A POWER METER	
HP 8901A POWER MODE	
NONE	x

(4) FREQUENCY COUNTER

HP 5383A	
HP 5334B	
HP 8901A	
HP 8563E	x

NAME OF TEST: Frequency Stability (Temperature Variation)

TEMPERATURE, °C	CHANGE IN FREQUENCY	
	Hz	ppm
-30	-5.25	0.0
-20	5.23	0.0
-10	6.97	0.0
0	11.45	0.0
10	-3.97	0.0
20	6.16	0.0
25	10.17	0.0
30	11.37	0.0
40	11.23	0.0
50	14.24	0.0
60	27.84	0.0

NAME OF TEST: FREQUENCY STABILITY - VOLTAGE VARIATION

PARAGRAPH: 47 CFR 2.995 (b)(1)

GUIDE: SEE MEASUREMENT PROCEDURE BELOW

TEST CONDITIONS: AS SHOWN

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.

MEASUREMENT RESULTS

LIMIT: Must remain within authorized frequency block.

STV, %	Vdc	CHANGE IN FREQUENCY, Hz
85	3.3	8
100	3.9	10
115	4.5	1
BATTERY END POINT:	3.2	10

M.Flom P.Eng.

MORTON FLOM, P. Eng.

SUPERVISED BY:

NAME OF TEST: FREQUENCY STABILITY - VOLTAGE VARIATION

PARAGRAPH: 47 CFR 2.995 (b)(1)

GUIDE: SEE MEASUREMENT PROCEDURE BELOW

TEST CONDITIONS: AS SHOWN

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.

MEASUREMENT RESULTS

LIMIT: Must remain within authorized frequency block.

STV, %	Vdc	CHANGE IN FREQUENCY, Hz
85	3.3	8
100	3.9	10
115	4.5	1
BATTERY END POINT:	3.2	10

MORTON FLOM, P. Eng.

SUPERVISED BY:

NAME OF TEST: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

PARAGRAPH: 47 CFR 2.202(g)

MODULATION = DATA

NECESSARY BANDWIDTH:

NECESSARY BANDWIDTH (B_N), kHz, maximum
(measured at the 99.75% power bandwidth) = 30

SUPERVISED BY: MORTON FLOM, P. Eng.

TESTIMONIAL
AND
STATEMENTOF CERTIFICATION

LJPNSW-3ND

THIS IS TO CERTIFY:

1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.

2. THAT the technical data supplied with the application was taken under my direction and supervision.

3. THAT the data was obtained on representative units, randomly selected.

4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

CERTIFYING ENGINEER:

M. Flom P. Eng.

MORTON FLOM, P. Eng.

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).

M.Flom P.Eng

MORTON FLOM, P. Eng.

TEST INSTRUMENTATION LIST

All equipment calibrated within last 90 days

ADAPTER
HP X281 (Coaxial waveguide); HP S281; HP 85659 (Quasi peak)

AMPLIFIER
Pre-amp. HP 10885A (2-1300 MHz); HP 8447D, HP 8447E, HP 8449A

ANTENNA *See end*

ATTENUATOR
Kay 432D; Power, Sierra 661A-30; Narda 76610; Narda 4779-3, -6, -10 dB

AUDIO OSCILLATOR
HP 204D; AIEC DTC-1; Motorola S-1333B; HP 3312A; HP 8903A

BATTERY
Sears Diehard, Stock #4341

CAMERA
Oscilloscope, Tektronix C5A; Polaroid Impulse AF; Kodak DC-50

CAPACITOR
Feed-Thru, 10 µF, Solar 6512-106R; Solar 7525-1

CLOSE FIELD PROBE
HP 11940A, 11941A, HP 11945A

COMPUTER
HP 332; HP Vectra 486/25VL; Various PC COmpatables

CONVERTOR, Down
HP 117 10B

COUPLER
Narda 1080, Waveguide; HP S750E (Cross guide); Waveline 274/40; Solar 7415-3; Solar 7835-891 & -896

CURRENT PROBE
Solar 6741-1

DETECTOR
HP 8470B

DIGITAL MULTIMETER
HP 3476A w/H.F. Probe; Fluke 8030A-01; HP 3478A

DISTORTION ANALYZER
HP 334A; HP 8903A

ELECTRONIC COUNTER
HP 5383A; HP 5334B

FILTER
Cirqtel FHT/7-50-57/ 50-1A/1B (HP); Jerrold TLB-1; TNB-1, Piezo 5064; Eagle TNF-I Series, Kronn-Hite 3202; Phelps-Dodge #PD-495-8; Newtone #PD6000 Line Protector; 870-890 MHz (Lab Design); 900 MHz (Lab Design); Solar High-Pass s/n 882029

FREQ. DEV. METER
HP 8901A

FREQ. DOUBLER
HP 11721A

FREQUENCY METER
HP 537A; HP 536A

GENERATOR
Solar 6550-1 (power sweep); HP 8640B, GAW 1012, HP 8656A (signal); Solar 8282-1 (spike)

HUMIDITY CHAMBER
Ambem Co Fw30; Bowser 0

LIMITER, R.F
HP 11867A; HP 11693A; HP 10509A

LISN
Singer 91221-1; Ailtech 94641-1 (50µH)

LOAD, POWER
Telewave TLW-25; Bird 8329

MILLIAMETER
HP 428B

MIXER
HP 10514A; Mini-Circuits TAK-1H

OPEN FIELD SITE
As filed with FCC & IC and kept up-dated.
TURNTABLES:
Up to 2000# capacity
GROUND SCREEN:
Complies with docket 80-284
ANTENNA MAST:
Complies as above

OSCILLOSCOPE
HP 1741A; HP 181T; Tektronix T935; HP 54502A

PHANTOM
M.F.A. Labs Left and Right human head

PLOTTER
HP 7470; HP/475A

POWER METER
AF GR 1840A; HP 435A with 8481A & 8482H Power Sensors; HP 436A; HP 8901A

POWER SUPPLY
HP 6286A; Heathkit IP 2711; IP 5220; Honda EM400 (portable gas gen.); HP 6012

PRINTER
Brother HL-8; Brother HL-10V; HP DeskJet 640C

R. F. PRESELECTOR
HP 85685A

RADIATION METER
Narda 8717 w/8010 Amp, 8021B and 8760 probes

RESISTOR, PRECISION
Solar 7144-1.0, 7144-10.0; Solar 8525-1

SCALE
Weigh-Tronix 3632T-50

SCANNER
HP 9190A Scanjet

SCREEN ROOM
Lindgren 22-2/2-0

SIGNAL LEVEL METER
Jerrold 704B

SIGNAL SAMPLER
R. F. Bird 4273-030, 4275-030

SINAD/VOLTMETER
Helper Sinadder

SPECTRUM ANALYZER
HP 8558B, 8557; HP 8563E; HP 853A; HP 85668/8568B

TEMPERATURE CHAMBER
Tenney, Jr

TEMPERATURE PROBE
Fluke 80T-150C

TERMINATION
Narda 3208 Waveguide. Waveline #281

TEST SET
Semi-Automatic: HP 8953A; HP 8954A Interface: Computer / Controller; P.S. Programmer; HP 59501A; RF Communications: HP 8920A

TRANSFORMERS
Audio Isolation: Solar 6220-1A; Impedance: HP 11694A; Isolation: Solar 7032-1; Matching: Solar 7033-1

TRANSMISSION & NOISE MEASURING SET
HP 3555B

VIBRATION CHAMBER
Unholtz-Dickie T 500; Unholtz-Dickie T 40U0

VOLTMETER
HP 410C; HP 3478A

WATTMETER
Bird 43, Sierra 174A-2

ANTENNAS

30 - 50 Hz
Emco 7603 M-Field; Emco 7604 M-Field

20 - 200 MHz
Aprel Biconical Model AAB20200

20 - 300 MHz
Emco Biconical H-Field

25 - 1000 MHz
Singer DM-105A; EMCO 3121C

200 - 1000 MHz
Aprel Log Periodic, Model AALP 2001

10 kHz - 30 MHz
Emco 3107B, E-Field; Emco 3101B/1, Rod E-Field

10 kHz - 32 MHz
Singer 94593-1 (Loop)

150 kHz - 32 MHz
Singer 92197-1 (41")

150 kHz - 32 MHz
Singer 93049-1 (9')

1 - 10 GHz
Singer 90794-A Discone

1 - 18 GHz
Horn: Aprel Model AAH-118

18 - 40 GHz
Emco 3116, Horn

40 - 60 GHz
Horn: HP 11970U, HP 11971U, HP 11975A (Lo Drive Amplifier)

50 - 75 GHz
Mixer, HP 11970V, HP 11971V

75 - 110 GHz
Mixer, HP 11970W

Digital mode PCS (D-AMPS TDMA)

meas nr:	Phone position	Frequency MHz / channel	Power [dBm]	SAR (1g) [mW/g]
7	90°	1850.0 / 2	25.6	1.27
8	90°	1880.0 / 1000	25.7	1.13
9	90°	1910.0 / 1998	25.2	0.93
FCC ID: LJPNSW-3ND MEASURED: 10.3.1997 / NMP		FCC limit		1.60 [mW/g] (ANSI/IEEE)