**MEASUREMENT AND TECHNICAL REPORT**

CUBIC COMMUNICATIONS, INC.
9535 Waples Street
San Diego, CA 92121-2953

**DATE: 25 February 1999**

| | | |
|---|---|---|
| **This Report Concerns:** | Original Grant: X | Class II Change: |
| **Equipment Type:** | 5 kW HF Transmitter, Model CTX-5000, S/N 501 | |
| **Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?** | Yes: **Defer until:** | No: X |
| *Company Name* **agrees to notify the Commission by:** **of the intended date of announcement of the product so that the grant can be issued on that date.** | N/A | |
| **Transition Rules Request per 15.37?** | Yes: | *No: |

*(*) FCC Part 2, Paragraphs 2.985, 2.987(a), (c), 2.991, 2993, Part 87, Paragraphs 87.131, 87.139, 87.141*

***Report Prepared by:***

**TÜV PRODUCT SERVICE**
**10040 Mesa Rim Road**
**San Diego, CA 92121-2912**
**Phone: 619 546 3999**
**Fax: 619 546 0364**

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# 1 GENERAL INFORMATION

## 1.1 Product Description

| NAME, MODEL, SERIAL # OF EUT: | 5 kW HF Transmitter, Model CTX-5000, S/N 501 |
|---|---|
| DESCRIPTION OF EUT: | Transmitter, output power = 5 kW maximum, ±1 dB; frequency range = 2-30 MHz. |

**Components of EUT**

| Description | Model Number | Serial Number | FCC ID Number |
|---|---|---|---|
| Exciter | T-4180 | 606 | NVSCTX-1000 |
| Control unit | CTX-5000 | 501 | N/A |
| Power supply | 30330 | 1011838 | N/A |
| Power supply | 30330 | 1010558 | N/A |
| PA 1 | PA5050A | 616 | NVSCTX-1000 |
| PA 2 | PA5050A | 617 | N/A |
| PA 3 | PA5050A | 618 | N/A |
| PA 4 | PA5050A | 614 | N/A |
| PA 5 | PA5050A | 619 | N/A |
| PA 6 | PA5050A | 613 | N/A |
| Combiner | 1260-D6 | 1578-980908 | N/A |

| OPERATING MODE(S): | **USB; AME** |
|---|---|

**I/O CABLES**

| CONNECTION | RF output | AC input Power | Audio | Serial remote |
|---|---|---|---|---|
| SHIELD | Yes | No | Yes | Yes |
| CONNECTORS | Type LC | Yes | D-sub, 15-pin | D-sub, 15-pin |
| TERMINATION TYPE | 50 ohm load | -- | -- | -- |
| LENGTH | 6' | 50' | -- | -- |
| REMOVABLE | Yes | Yes | Yes | Yes |

| POWER CORDS | See I/O cables |
|---|---|

**POWER INTERFACE**

| FREQUENCY/AC/DC VOLTAGE: | 60 Hz/ 208 Vac |
|---|---|
| PHASES/CURRENT: | 3 / -- |

**OSCILLATOR FREQUENCIES**

| FREQUENCY (MHz) | EUT LOCATION | DESCRIPTION OF USE |
|---|---|---|
| 10.000 MHz | T-4180 | Frequency reference |
| Variable 42.455-70.455 | T-4180 | 3rd L.O. |
| 40 MHz | 5-4180 | 2nd L.O. |
| 480 kHz | T-4180 | 1st L.O. |
| 48 MHz | T-4180 | DSP clock |
| 32 " | T-4180 | CPU clock |
| 50 " | PA-5050 | CPU clock |
| 50 " | CONTROLLER | CPU clock |
| 1.8432 MHz | CONTROLLER | Uart clock |
| 1.8432 MHz | PA-5050 | Uart clock |

**POWER SUPPLY**

| DESCRIPTION | MANUFACTURER | MODEL # | SERIAL # | SWITCHING/LINEAR FREQ. |
|---|---|---|---|---|
| 28 Vdc, 330 AMPS | Power Ten | 30330 | 1011838 | Switching - frequency unknown. |
| 28 Vdc, 330 AMPS | Power Ten | 30330 | 1010558 | |

| POWER LINE FILTERS | | | |
|---|---|---|---|
| MANUFACTURER | MODEL NO. | QTY. | LOCATION ON EUT |
| Unknown<br>Corcom | Unknown<br>3EF2F | 2<br>1 | Power supplies<br>T-4180 |
| CRITICAL EMI COMPONENTS | -- | | |
| DESCRIPTION OF ENCLOSURE: | Dual side-by-side 19" racks. | | |

| INTERFACING AND/OR SIMULATORS PERIPHERAL EQUIPMENT: | | | | |
|---|---|---|---|---|
| DESCRIPTION | MANUFACTURER | MODEL # | SERIAL # | FCC ID |
| N/A | | | | |

# 1 GENERAL INFORMATION (continued)

## 1.2 Related Submittal/Grant

**None**

## 1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

### 1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

- X 1. Conducted Emissions, FCC Part 2, ParagraphS 2.987(a)(c); 2.989; 2.991 and Part 87, Paragraph 87.139
- 2. Radiated Emissions EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- X 3. Radiated Emission per FCC Part 2, Paragraph 2.993, & Part 87, Paragraph 87.139
- 4. Engineering evaluations
- 5. Frequency Stability, Part 2, Paragraph 2.995, and Part 87, Paragraph 87.133
- X RF Output Power, Part 2, Paragraph 2.985, Part 87, Paragraph 87.131

Both Conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8 - M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 10 GHz).

### 1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax:  619 546 0364

The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

### 1.6 Part 2 Requirements

**Production Quantity - more than one**

**Technical description** which shall include following items:

Type or **types of emission**. 3K15J3E; 3K00H3E

**Frequency Range**. 2-30 MHz

Frequency tolerance ±10 Hz
Emission Designator: 300kH3E; 300kJ3E
Microprocessor: i386EX
**Range of Operating Power values** or specific operating **power levels**;
**Description** of any means provided for **variation of operating power**.
100-5000 W

**Maximum power rating. 5000 W**

**DC voltages** applied to and **dc currents** into the final radio frequency amplifying device for normal operation over the power range.
28 V, 30 Amps maximum

**Function of each electron tube or semiconductor or other active circuit device**.
In manuals: T-4180, page 4-1; in PA-5050A, page 4-1.

Complete **circuit diagrams** and **schematic diagrams**. Attached

**Operating Manual** (User manual) If not available when the application is filed, a draft should be provided. The completed manual should be submitted as soon as available. The Commission may specify a date.
Attached

**Tune-up procedure** over the power range, or at specific operating power levels.
In manual.

**Description of all circuitry and devices** provided for determining and stabilizing frequency.
T-4180 manual 4-2.8 attached

**Description of circuits or devices employed for suppressions of spurious radiation, for limiting modulation, and for limiting power.**
T-4180 manual 4-2.8 attached.

**Description of the modulation system** used, including the response characteristics (frequency, phase and amplitude) of any filters provided;
In T-4180 manual: 4-2.6.2 attached.

**Description of the modulating wavetrain**, shall be submitted for the maximum rated conditions under which the equipment will be operated.
In T-4180 manual: 4-2.6.2 attached.

# 2 PRODUCT LABELING

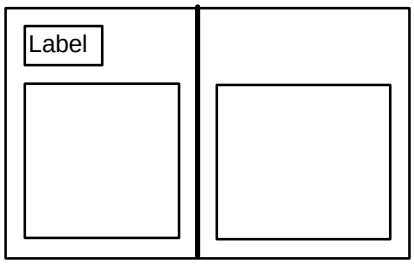
**Figure 2.1 FCC ID Label**

See following page.


CUBIC COMMUNICATIONS
SAN DIEGO, CA, USA CAGE CODE 59532
MODEL DESC. 5KW SYSTEM
MODEL NO. CTX-5000
PART NO. 2245-1000-1
SERIAL NO. 501
FCC ID NO. NVSCTX-5000
QAR

**Figure 2.2 Location of Label**

## Back, top, left of EUT



## 3. SYSTEM TEST CONFIGURATION

### 3.1 Justification

The 5 kW HF Transmitter, Model CTX-5000, S/N 501 was initially tested for FCC emission in the following configuration:

See Block Diagram, paragraph 4.1.

### 3.2 EUT Exercise Software

None

### 3.3 Special Accessories

None

### 3.4 Modification

None

### 3.5 Configuration of Tested System

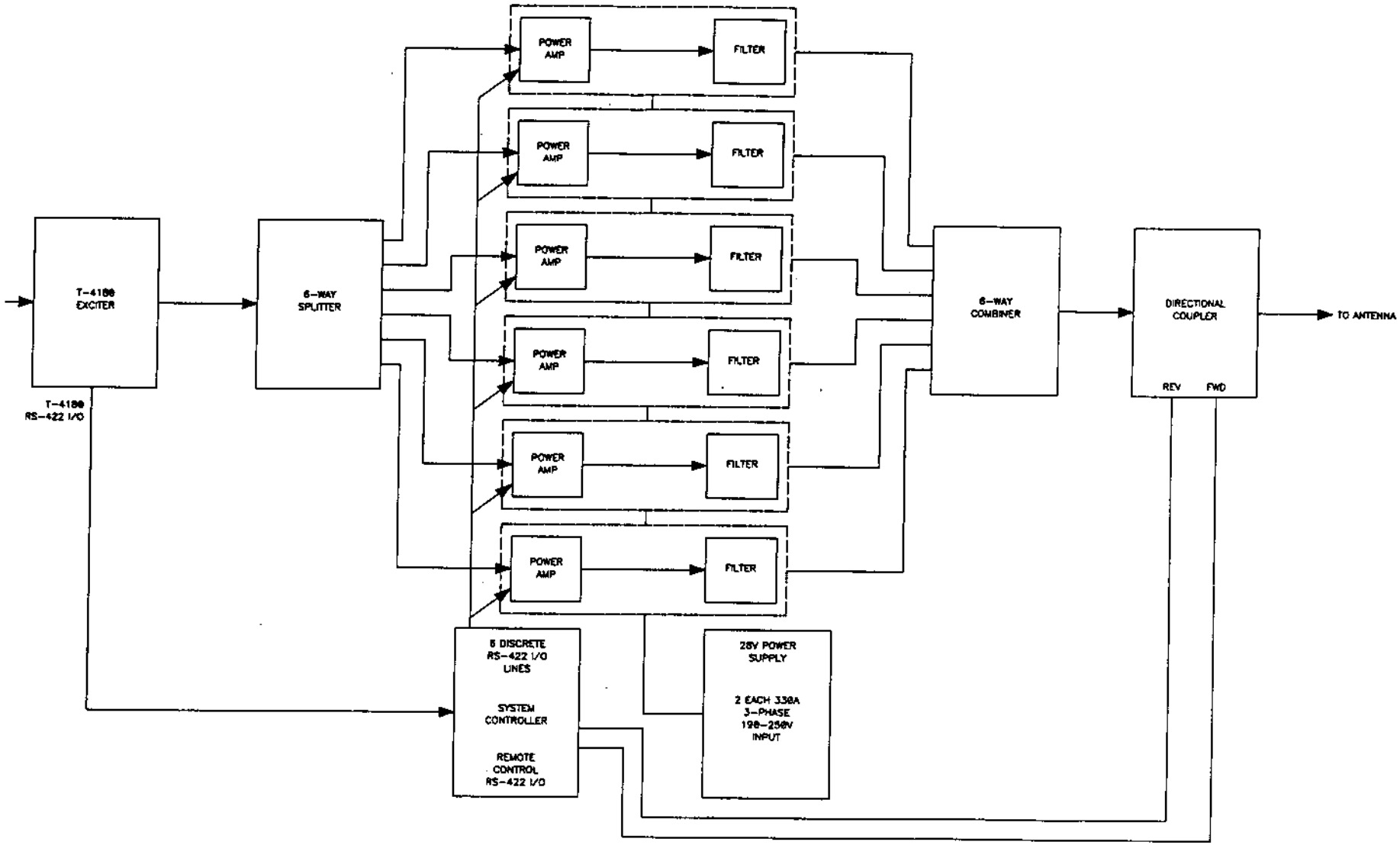
See Block Diagram, paragraph 4.1.

# 4 BLOCK DIAGRAM OF 5 kW HF Transmitter, Model CTX-5000, S/N 501

## 4.1 Block Diagram Description

Transmitter

See following page for block diagram.


T-4180
EXCITER
T-4180
RS-422 I/O
6-WAY
SPLITTER
POWER
AMP
FILTER
POWER
AMP
FILTER
POWER
AMP
FILTER
POWER
AMP
FILTER
POWER
AMP
FILTER
POWER
AMP
FILTER
6-WAY
COMBINER
DIRECTIONAL
COUPLER
REV
FWD
TO ANTENNA
6 DISCRETE
RS-422 I/O
LINES
SYSTEM
CONTROLLER
REMOTE
CONTROL
RS-422 I/O
28V POWER
SUPPLY
2 EACH 330A
3-PHASE
198-256V
INPUT

# 5 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (which includes cable and antenna corrections), the corrected reading, and the limit.

See following page(s).

REPORT No: S8597 TESTED BY: DM SPEC: FCC Part 2, Para 2.993 & Part 87, Para. 87.139

CUSTOMER: Cubic Communications, Inc. TEST DIST: 3 Meters

E U T: CTX-5000 5kW HF Transmitter TEST SITE: 1

EUT MODE: Full Power - Transmit BICONICAL: 451

DATE: 10-Dec-98 LOG PERIODIC: 243

NOTES: OTHER: 427 and 459

RBW and VBW = 100 kHz above 30 MHz.

RBW and VBW = 10 kHz below 30 MHz using a spectrum analyzer.

Used rod antenna below 30 MHz.

| FREQ (MHz) | VERTICAL (dBuv) pk | av | HORIZONTAL (dBuv) pk | av | CORRECTION FACTOR (dB/m) | MAX LEVEL (dBuV/m) pk | av | SPEC LIMIT (dBuV/m) pk | av | MARGIN (dB) pk | av | EUT Rotatio | Antenna Height | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 96.6 | | | | 20.0 | **116.6** | | - | | | | | | |
| 58 | 45.5 | | 38.7 | | 11.7 | **57.2** | | 84.4 | | -27.2 | | | | |
| 87 | 66.6 | | 65 | | 9.9 | **76.5** | | 84.4 | | -7.9 | | 0 | 1.5 | |
| 116 | 49.3 | | 46.3 | | 14.8 | **64.1** | | 84.4 | | -20.3 | | | | |
| 145 | 53.6 | | 37.2 | | 18.1 | **71.7** | | 84.4 | | -12.7 | | | | |
| 174 | 46.6 | | 41.2 | | 19.0 | **65.6** | | 84.4 | | -18.8 | | | | |
| 203 | 57.7 | | 51.9 | | 16.0 | **73.7** | | 84.4 | | -10.7 | | | | |
| 232 | 42.2 | | 42.7 | | 17.1 | **59.8** | | 84.4 | | -24.6 | | | | |
| 261 | 49.6 | | 47.2 | | 18.7 | **68.3** | | 84.4 | | -16.1 | | | | |
| 290 | 37 | | 28.5 | | 19.7 | **56.7** | | 84.4 | | -27.7 | | | | |

REPORT No: S8597 TESTED BY: DM& MW SPEC: FCC Part 2, Para. 2.993 & Part 87, Para. 87.139

CUSTOMER: Cubic Communications, Inc. TEST DIST: 3 Meters

E U T: CTX-5000 5kW HF Transmitter TEST SITE: 1

EUT MODE: Full Power - Transmit BICONICAL: 451

DATE: 12/10& 22/98 LOG PERIODIC: 243

NOTES: (*) OTHER: 427 and 459

RBW and VBW = 100 kHz above 30 MHz.
RBW and VBW = 10 kHz below 30 MHz using a spectrum analyzer.
Used rod antenna below 30 MHz.

| FREQ (MHz) | VERTICAL (dBuv) pk | av | HORIZONTAL (dBuv) pk | av | CORRECTION FACTOR (dB/m) | MAX LEVEL (dBuV/m) pk | av | SPEC LIMIT (dBuV/m) pk | av | MARGIN (dB) pk | av | EUT Rotatio | Antenna Height | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 73.5 | | - | | 20.0 | **93.5** | | - | | | | | | |
| 32 | 23 | | 10 | | 20.2 | **43.2** | | 84.4 | | -41.2 | | | | |
| 48 | 59.5 | | 59.4 | | 14.7 | **74.2** | | 84.4 | | -10.2 | | 331 | 1 | |
| 64 | 43 | | 30 | | 10.0 | **53.0** | | 84.4 | | -31.4 | | | | |
| 80 | 65 | | 62 | | 8.7 | **73.7** | | 84.4 | | -10.7 | | 180 | 1 | |
| 96 | 55.6 | | 57 | | 11.6 | **68.6** | | 84.4 | | -15.8 | | | | |
| 112 | 53 | | 51 | | 14.5 | **67.5** | | 84.4 | | -16.9 | | | | |
| 128 | 34.8 | | 33 | | 16.4 | **51.2** | | 84.4 | | -33.2 | | | | |
| 144 | 48.3 | | 43.3 | | 18.0 | **66.3** | | 84.4 | | -18.1 | | 90 | | |
| 160 | 46.4 | | 39 | | 18.4 | **64.8** | | 84.4 | | -19.6 | | | | |

(*) Tie-wrapped I/O cables, power cables, etc. to chassis. Grounded chassis to turntable at all four corners and at the back. Installed a filter, Delta 3E80D, 3x80AMP/250 Vac viewed from the rear on the bottom center of the left rack.

REPORT No: S8597 TESTED BY: DM & MW SPEC: FCC Part 2, Para. 2.993 & Part 87, Para. 87.139

CUSTOMER: Cubic Communications, Inc. TEST DIST: 3 Meters

E U T: CTX-5000 5kW HF Transmitter TEST SITE: 1

EUT MODE: Full Power - Transmit BICONICAL: 451

DATE: 12/11& 22/98 LOG PERIODIC: N/A

NOTES:(*) 427 and 459

RBW and VBW = 100 kHz above 30 MHz using a spectrum analyzer.

RBW and VBW = 10 kHz below 30 MHz using a spectrum analyzer.

12/22- RBW = 120 kHz using a receiver.

Used rod antenna for frequencies except 24, 56 and 80 MHz. Used biconical antenna for 24, 56 and 80 MHz.

| FREQ (MHz) | VERTICAL (dBuv) pk | av | HORIZONTAL (dBuv) pk | av | CORRECTION FACTOR (dB/m) | MAX LEVEL (dBuV/m) pk | av | SPEC LIMIT (dBuV/m) pk | av | MARGIN (dB) pk | av | EUT Rotatio | Antenna Height | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 56.5 | | | | 20.0 | **76.5** | | - | | | | | | |
| 16 | 33.7 | | | | 20.0 | **53.7** | | 84.4 | | -30.7 | | | | |
| 24 | 30.1 | | 30.8 | | 25.7 | **56.5** | | 84.4 | | -27.9 | | | | |
| 32 | 24 | | | | 20.0 | **44.0** | | 84.4 | | -40.4 | | | | |
| 40 | 55.3 | | | | 20.0 | **75.3** | | 84.4 | | -9.1 | | 90 | | |
| 48 | 46.8 | | | | 20.0 | **66.8** | | 84.4 | | -17.6 | | | | |
| 56 | 56.4 | | 52.5 | | 14.7 | **71.1** | | 84.4 | | -13.3 | | | | |
| 64 | 37.4 | | | | 20.0 | **57.4** | | 84.4 | | -27 | | | | |
| 72 | 57.1 | | | | 20.0 | **77.1** | | 84.4 | | -7.3 | | 90 | | |
| 80 | 46.2 | | 44.7 | | 8.7 | **54.9** | | 84.4 | | -29.5 | | | | |

(*) Tie-wrapped I/O cables, power cables, etc. to chassis. Grounded chassis to turntable at all four corners and at the back. Installed a filter, Delta 3E80D, 3x80AMP/250 Vac viewed from the rear on the bottom center of the left rack.

REPORT No: S8597 TESTED BY: DM SPEC: FCC Part 2, Para. 2.993 & Part 87, Para. 87.139

CUSTOMER: Cubic Communications, Inc. TEST DIST: 3 Meters

E U T: CTX-5000 5kW HF Transmitter TEST SITE: 1

EUT MODE: Full Power - Transmit BICONICAL: 451

DATE: 11-Dec-98 LOG PERIODIC: N/A

NOTES: OTHER: 427 and 459

RBW and VBW = 10 kHz below 30 MHz.

RBW and VBW = 100 kHz above 30 MHz.

Used spectrum analyzer and rod antenna.

| FREQ (MHz) | VERTICAL (dBuv) pk | av | HORIZONTAL (dBuv) pk | av | CORRECTION FACTOR (dB/m) | MAX LEVEL (dBuV/m) pk | av | SPEC LIMIT (dBuV/m) pk | av | MARGIN (dB) pk | av | EUT Rotatio | Antenna Height | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 71.4 | | | | 20.0 | **81.4** | | - | | | | | | |
| 8 | 33.1 | | | | 20.0 | **53.1** | | 84.4 | | -31.3 | | | | |
| 12 | 44.6 | | | | 20.0 | **64.6** | | 84.4 | | -19.8 | | | | |
| 16 | 34.4 | | | | 20.0 | **54.4** | | 84.4 | | -30 | | | | |
| 20 | 50 | | | | 20.0 | **70.0** | | 84.4 | | -14.4 | | | | |
| 24 | 44 | | | | 20.0 | **64.0** | | 84.4 | | -20.4 | | | | |
| 28 | 51 | | | | 20.0 | **71.0** | | 84.4 | | -13.4 | | | | |
| 32 | 11 | | | | 20.0 | **31.0** | | 84.4 | | -53.4 | | | | |
| 36 | 29.9 | | | | 20.0 | **49.9** | | 84.4 | | -34.5 | | | | |
| 40 | 27 | | | | 20.0 | **47.0** | | 84.4 | | -37.4 | | | | |

REPORT No: S8597 TESTED BY: DM SPEC: FCC Part 2, Para. 2.993 & Part 87, Para. 87.139

CUSTOMER: Cubic Communications, Inc. TEST DIST: 3 Meters

E U T: CTX-5000 5kW HF Transmitter TEST SITE: 1

EUT MODE: Full Power - Transmit BICONICAL: N/A

DATE: 11-Dec-98 LOG PERIODIC: N/A

NOTES: OTHER: 427 and 459

RBW and VBW = 10 kHz.

Used spectrum anlayzer and rod antenna.

| FREQ (MHz) | VERTICAL (dBuv) pk | av | HORIZONTAL (dBuv) pk | av | CORRECTION FACTOR (dB/m) | MAX LEVEL (dBuV/m) pk | av | SPEC LIMIT (dBuV/m) pk | av | MARGIN (dB) pk | av | EUT Rotatio | Antenna Height | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 76.3 | | | | 20.0 | **96.3** | | - | | | | | | |
| 4 | 45.3 | | | | 20.0 | **65.3** | | 84.4 | | -19.1 | | | | |
| 6 | 57.8 | | | | 20.0 | **77.8** | | 84.4 | | -6.6 | | 90 | | |
| 8 | 33.2 | | | | 20.0 | **53.2** | | 84.4 | | -31.2 | | | | |
| 10 | 45 | | | | 20.0 | **65.0** | | 84.4 | | -19.4 | | | | |
| 12 | 35.7 | | | | 20.0 | **55.7** | | 84.4 | | -28.7 | | | | |
| 14 | 38 | | | | 20.0 | **58.0** | | 84.4 | | -26.4 | | | | |
| 16 | 36.1 | | | | 20.0 | **56.1** | | 84.4 | | -28.3 | | | | |
| 18 | 32 | | | | 20.0 | **52.0** | | 84.4 | | -32.4 | | | | |
| 20 | 23 | | | | 20.0 | **43.0** | | 84.4 | | -41.4 | | | | |

## Emissions Test Conditions: RADIATED EMISSIONS, FCC Part 2, Paragraph 2.993 and Part 87, Paragraph 87.139

**The *RADIATED EMISSIONS* measurements were performed at the following test location :**

☐ **- Test not applicable**

☐ - Roof (Small Open Area Test Site)
■ - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
☐ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

**Testing was performed at a test distance of:**

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

**Test Equipment Used :**

| Model No. | Prop. No. | Description | Manufacturer | Serial No. | Cal Date |
|---|---|---|---|---|---|
| 3110 | 451 | Antenna, Biconical | EMCO | 1378 | 09/26/99 |
| 3146 | 243 | Antenna, Log Periodic Dipole | EMCO | 106X | 09/26/99 |
| ESVS 30 | 427 | EMI Test Receiver | Rohde & Schwarz | 830350/006 | 02/12/99 |
| ESHS 30 | 459 | EMI Test Receiver | Rohde & Schwarz | 832354/004 | 01/05/99 |

Remarks: _____

**Field Strength Calculation**

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna , cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings  can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

Corrected Meter Reading Limit (CMRL) =  SAR  +  AF  +  CL  -  AG  -  DC

Where, SAR = Spectrum Analyzer Reading
AF  = Antenna Factor
CL  = Cable Loss
AG  = Amplifier Gain (if any)
DC  = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

CMRL = 29.4 dBuV  +  9.2dB  =  1.4 dB  -  20 dB/M  -  0.0 dB

CMRL = 20.0 dBuV/M

This result is well below the FCC and CSA Class A limit of 29.5 dbuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

# 6 CONDUCTED EMISSION DATA

## CUBIC COMMUNICATIONS, INC.

5 kW HF Transmitter, Model CTX-5000, S/N 501

See following page(s).

## Emissions Test Conditions: CONDUCTED EMISSIONS, FCC Part 2, Paragraphs 2.987(a),(c), 2.991 and Part 87, Paragraph 87.139

**The *RADIATED EMISSIONS* measurements were performed at the following test location :**

☐ **- Test not applicable**

☐ - Roof (Small Open Area Test Site)
■ - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
☐ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

**Testing was performed at a test distance of:**

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

**Test Equipment Used :**

Spectrum Analyzer, Hewlett Packard (HP), Model 8568B, P/N 187, Cal Date 10/05/99
Spectrum Analyzer Display, HP, Model 85662B, P/N 188, Cal Date 10/05/99
30 dB attenuator, P/N 534, JFW, Model 50FH-030-10, NCR
Variac, P/N 073, NCR
DMM, Tektronix, NCR
6 dB Attenuator, Narda, Model 766-6, P/N 590, NCR
6 dB Attenuator, Narda, Model 765-6, P/N 589, NCR
Directional Coupler, Werlatone, Model G5444, Cal Date 6/10/99
Frequency Counter, HP, 5386A, Cal Date 10/05/99
RF Power Meter, Bird Electronics Corp., Model 4421, S/N 0141, NCR
Power Sensor, Bird Electronics Corp., Model 4024, S/N 8032, Cal Date 6/16/99
Tenuline coaxial Attenuator (30 dB), Bird Electronics Corp., Model 8329-300, S/N 1593, NCR
Two Channel synthesizer, HP, 83326A, S/N 2437A00156, Clas Date 09/15/99
Audio Synthesizer Telulex, Model SG-100, Cal Date 10/06/99

Remarks: _____

**REPORT NO**: S8597 **DATE**: 08 January 1999

**TEST**: RF Output Power

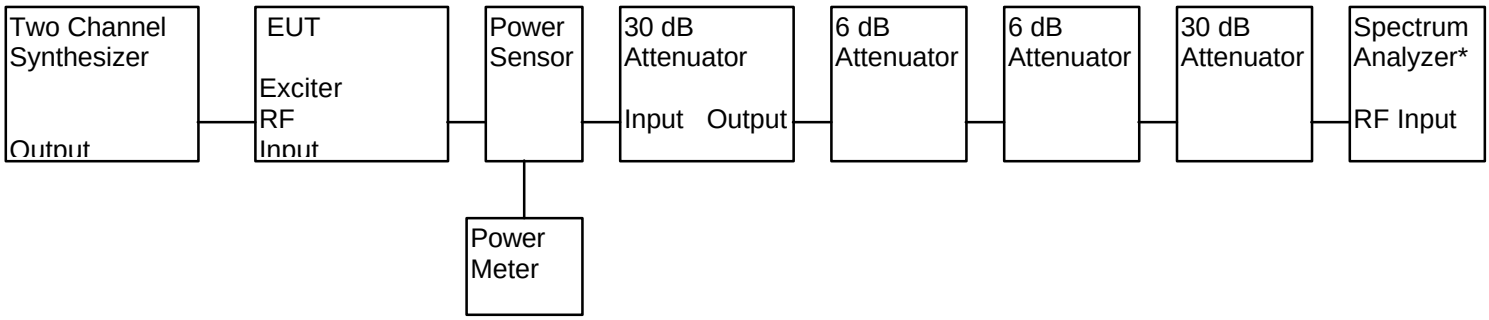
**CUSTOMER**: CUBIC COMMUNICATIONS, INC.

**EUT**: Model CTX-5000 5 kW HF Transmitter

**SPECIFICATION**: FCC Part 2, Paragraph 2.985 and Part 87, Paragraph 87.131

| Emission | $F_O$ (MHz) | Output Power (dBm) | Output Power (kW) |
|---|---|---|---|
| J3E | 2 | 66.6 | 4.6 |
| J3E | 4 | 66.8 | 4.8 |
| J3E | 8 | 66.6 | 4.6 |
| J3E | 16 | 66.6 | 4.6 |
| J3E | 29 | 66.4 | 4.4 |
| H3E | 2 | 66.6 | 4.6 |
| H3E | 4 | 66.8 | 4.8 |
| H3E | 8 | 66.6 | 4.6 |
| H3E | 16 | 66.6 | 4.6 |
| H3E | 29 | 66.2 | 4.2 |
| CW | 2 | 66.8 | 4.8 |
| CW | 4 | 66.9 | 4.9 |
| CW | 8 | 66.7 | 4.7 |
| CW | 16 | 66.8 | 4.8 |
| CW | 29 | 66.5 | 4.5 |

Test Setup for RF Output Power (Part 2, Paragraph 2.985)




*Used to ensure that power was present. Recorded power meter readings

**REPORT NO**: S8597 **DATE**: 16 December 1998

**TEST**: Frequency Stability

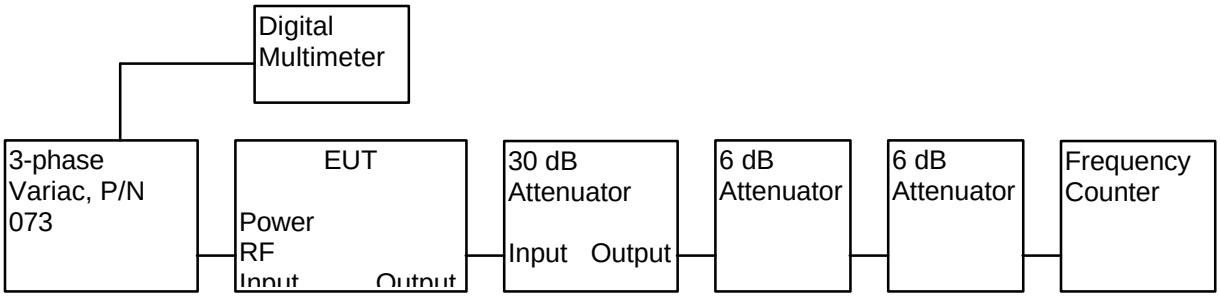
**CUSTOMER**: CUBIC COMMUNICATIONS, INC.

**EUT**: Model CTX-5000 5 kW HF Transmitter

**SPECIFICATION**: FCC Part 2, Paragraph 2.995(d)

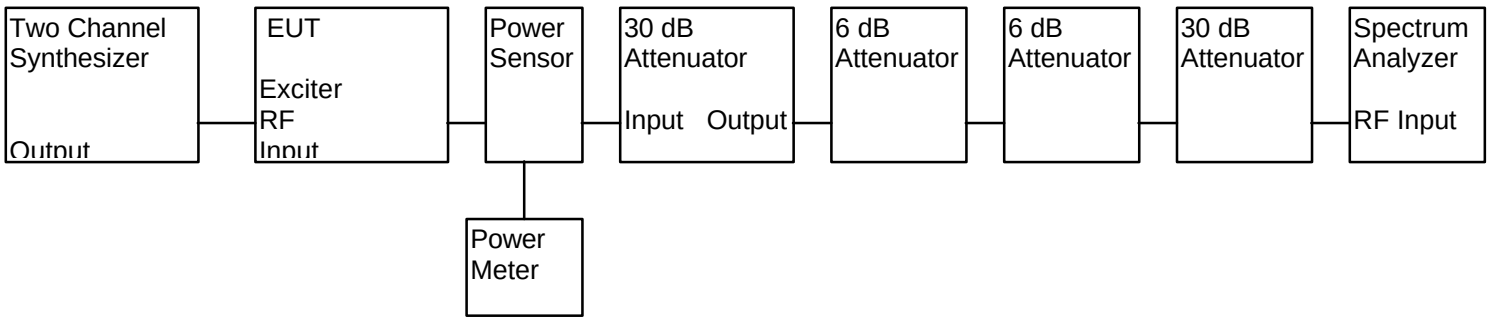
| Voltage (Vac) | Frequency (MHz) |
|---|---|
| 220 | 24.900012 |
| 187 | 24.900012 |
| 248 | 24.900011 |

Test Setup for Frequency Stability (Part 2, Paragraph 2.995(d)

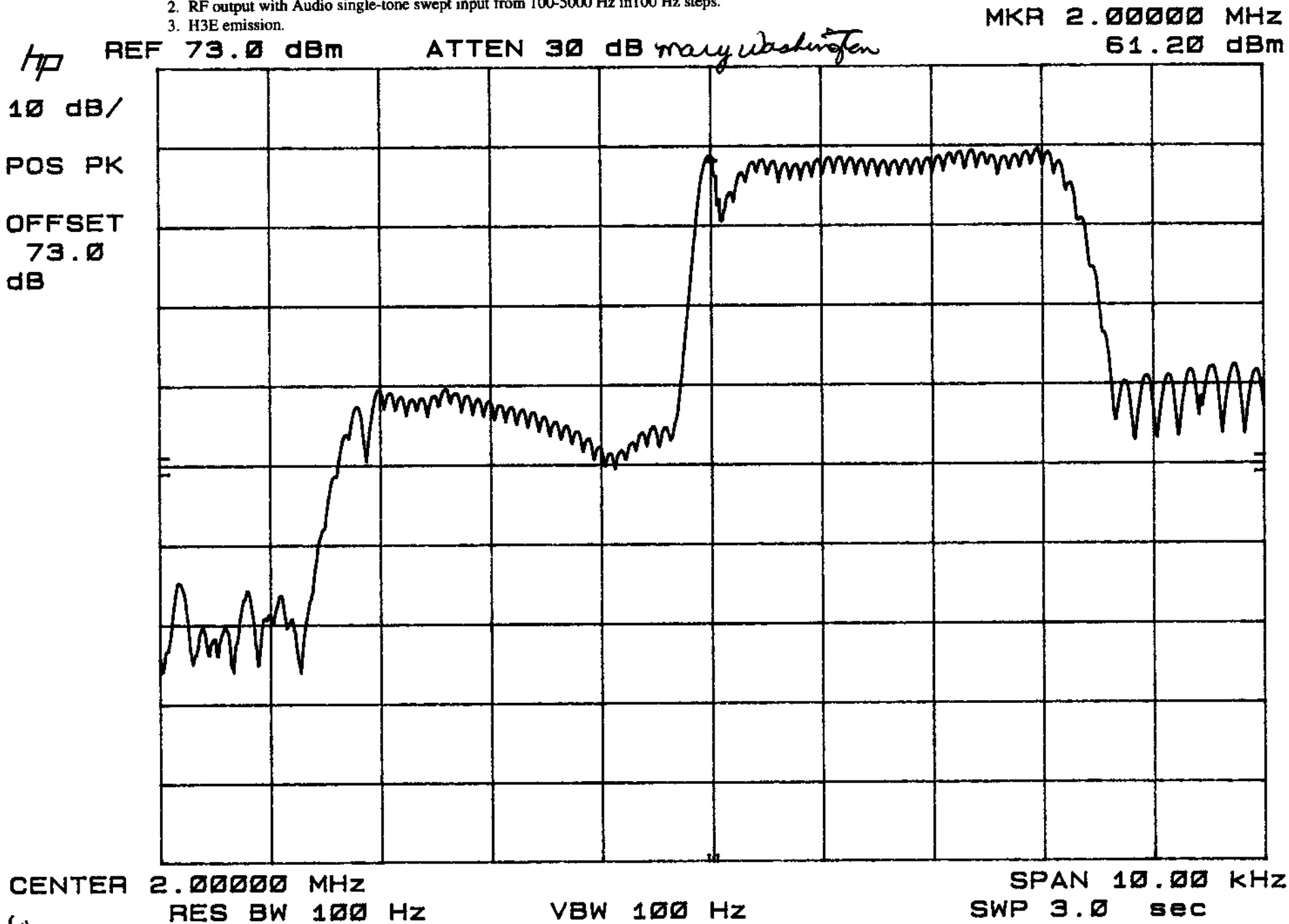



*Used to ensure that power was present. Recorded power meter readings

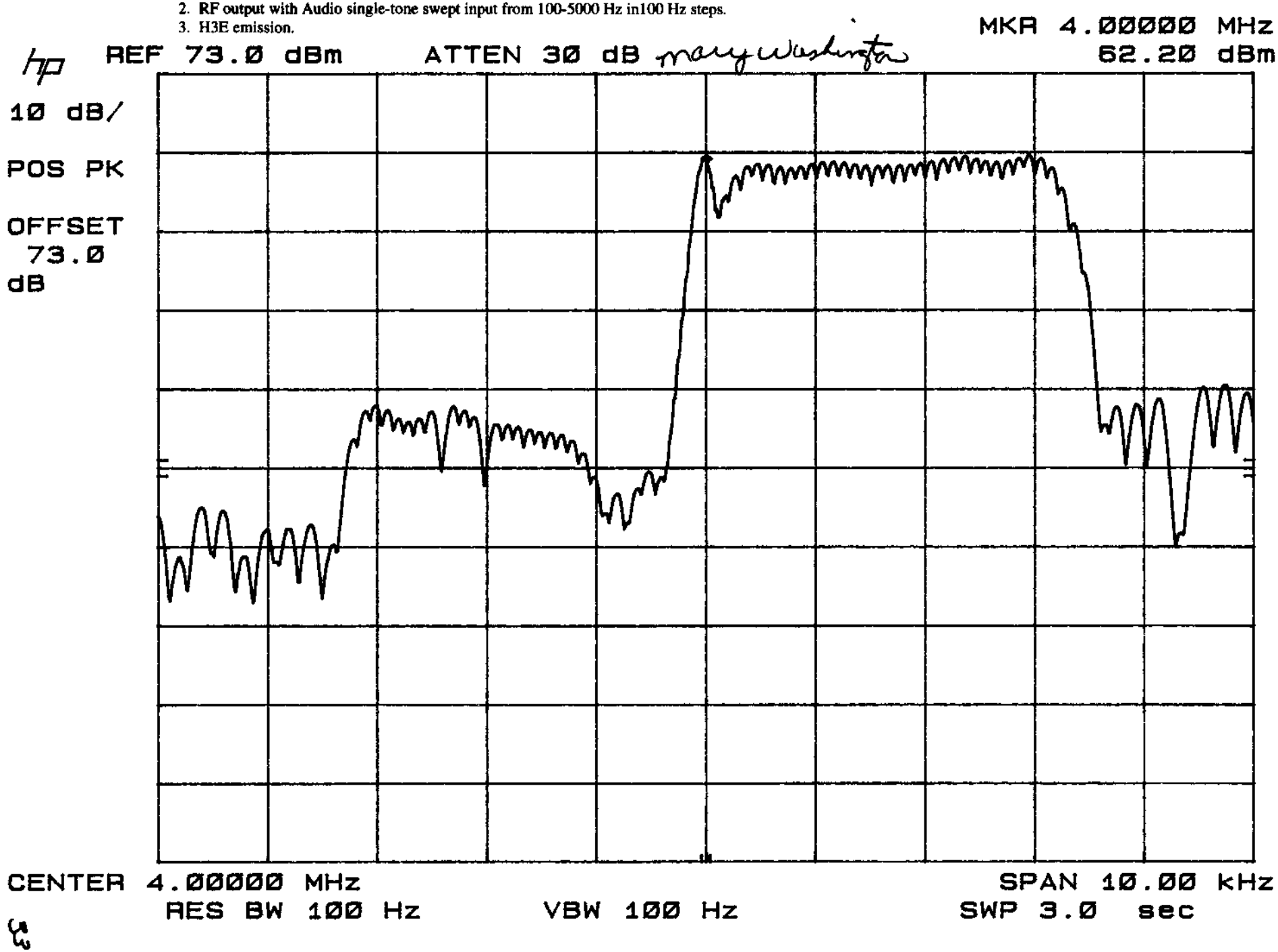
Test Setup for Rear Line Input (Part 2. 2.987(a), and Part 87, Paragraph 87.141)



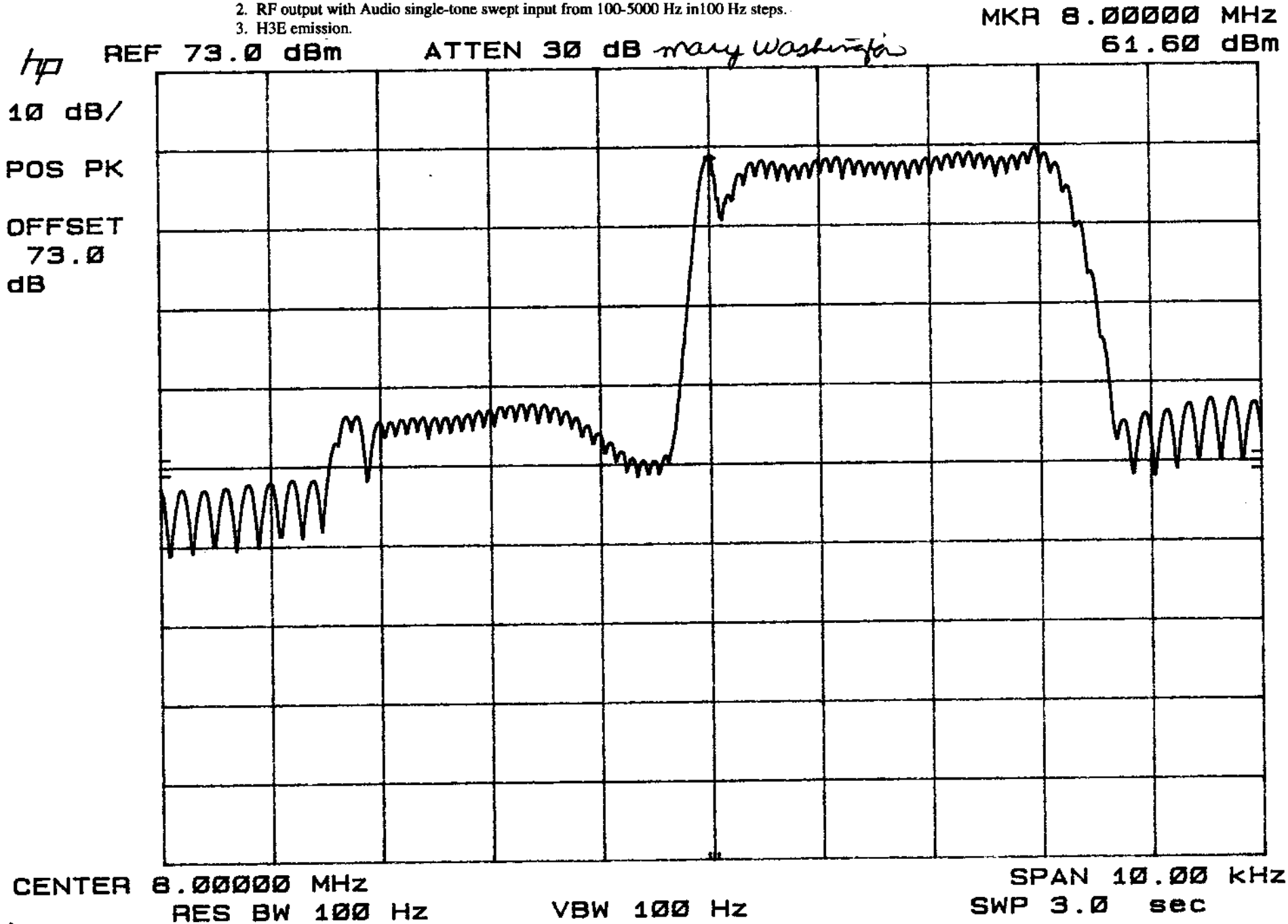
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. H3E emission.



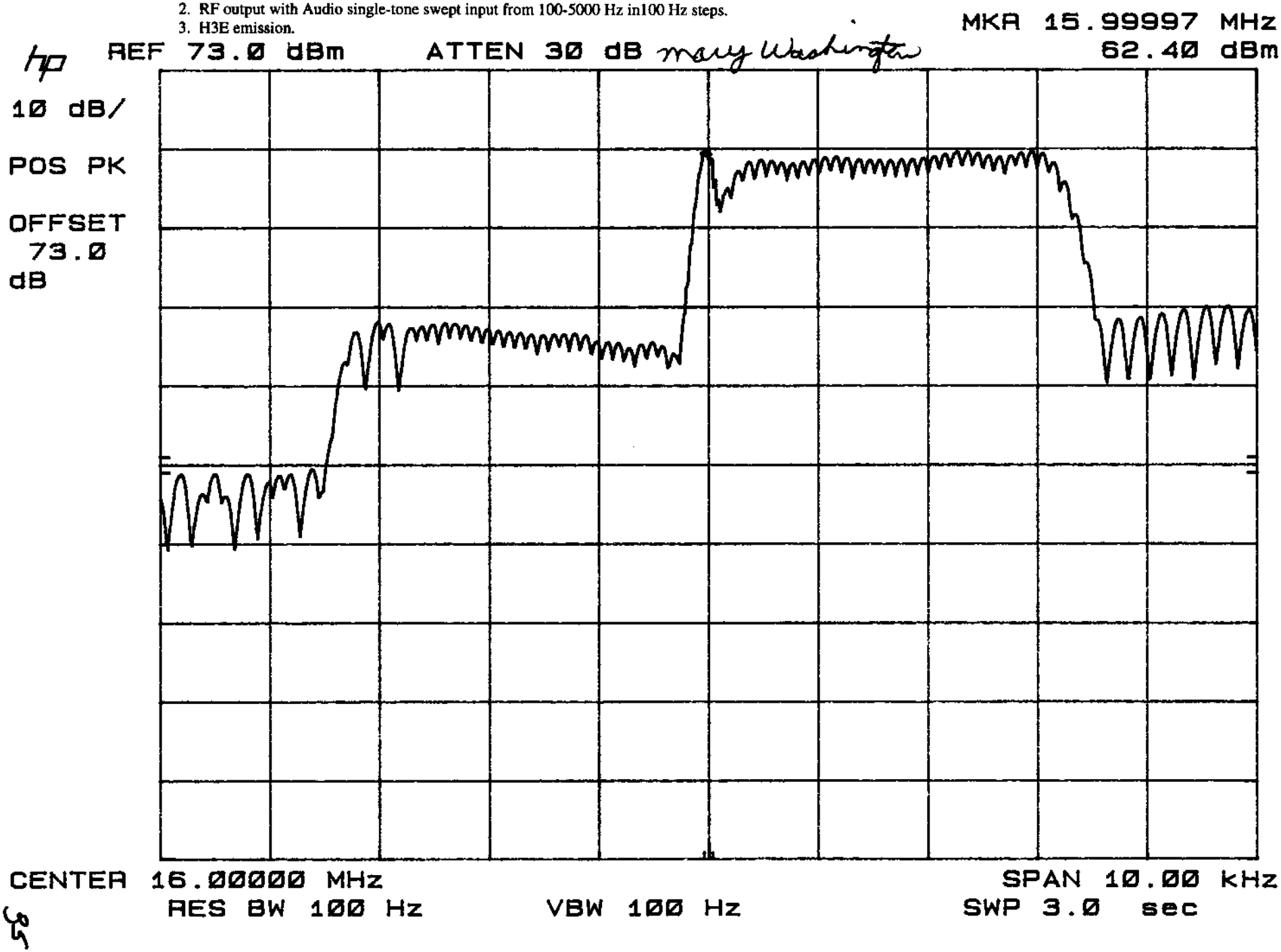
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. H3E emission.



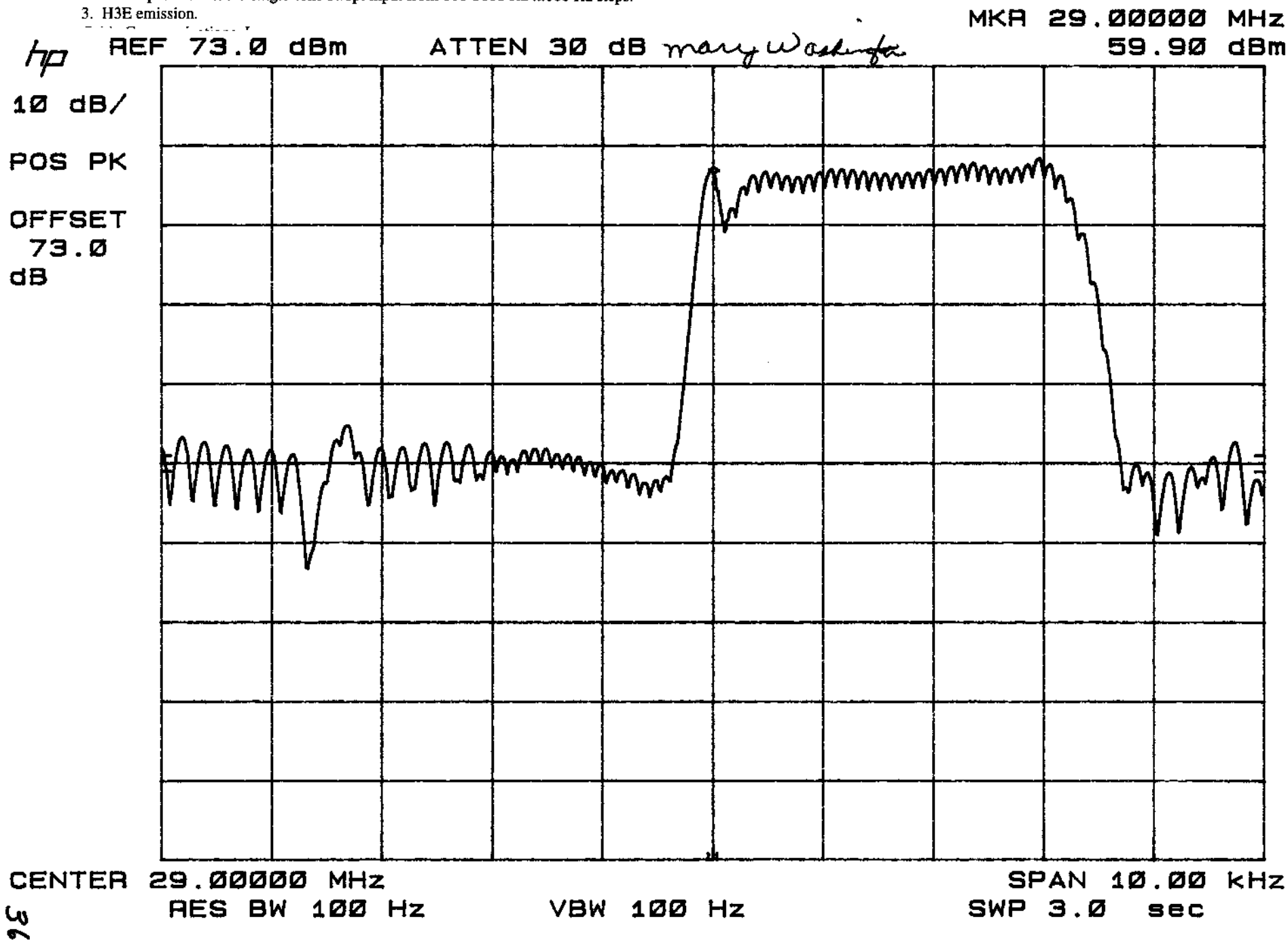
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. H3E emission.



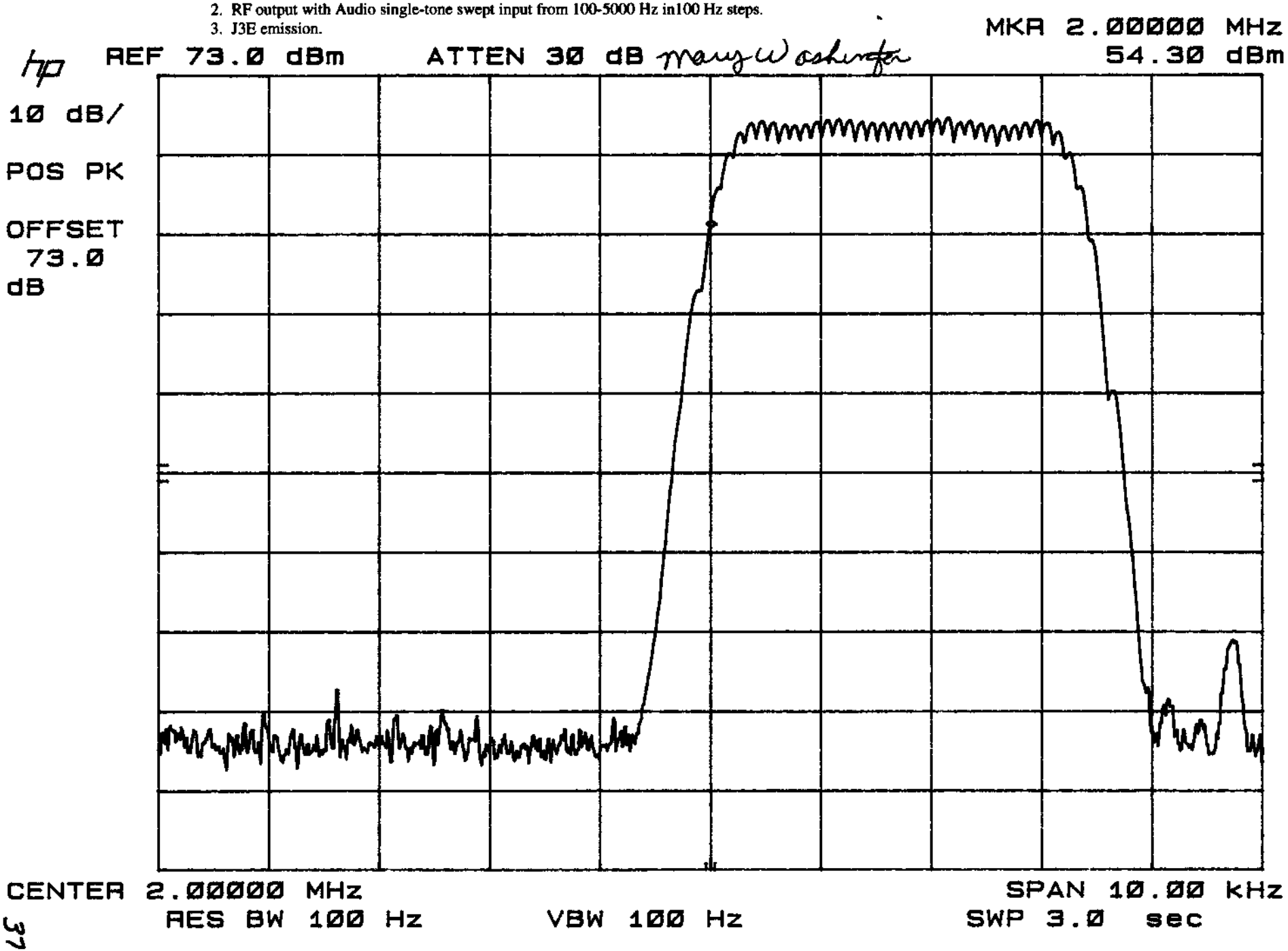
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. H3E emission.



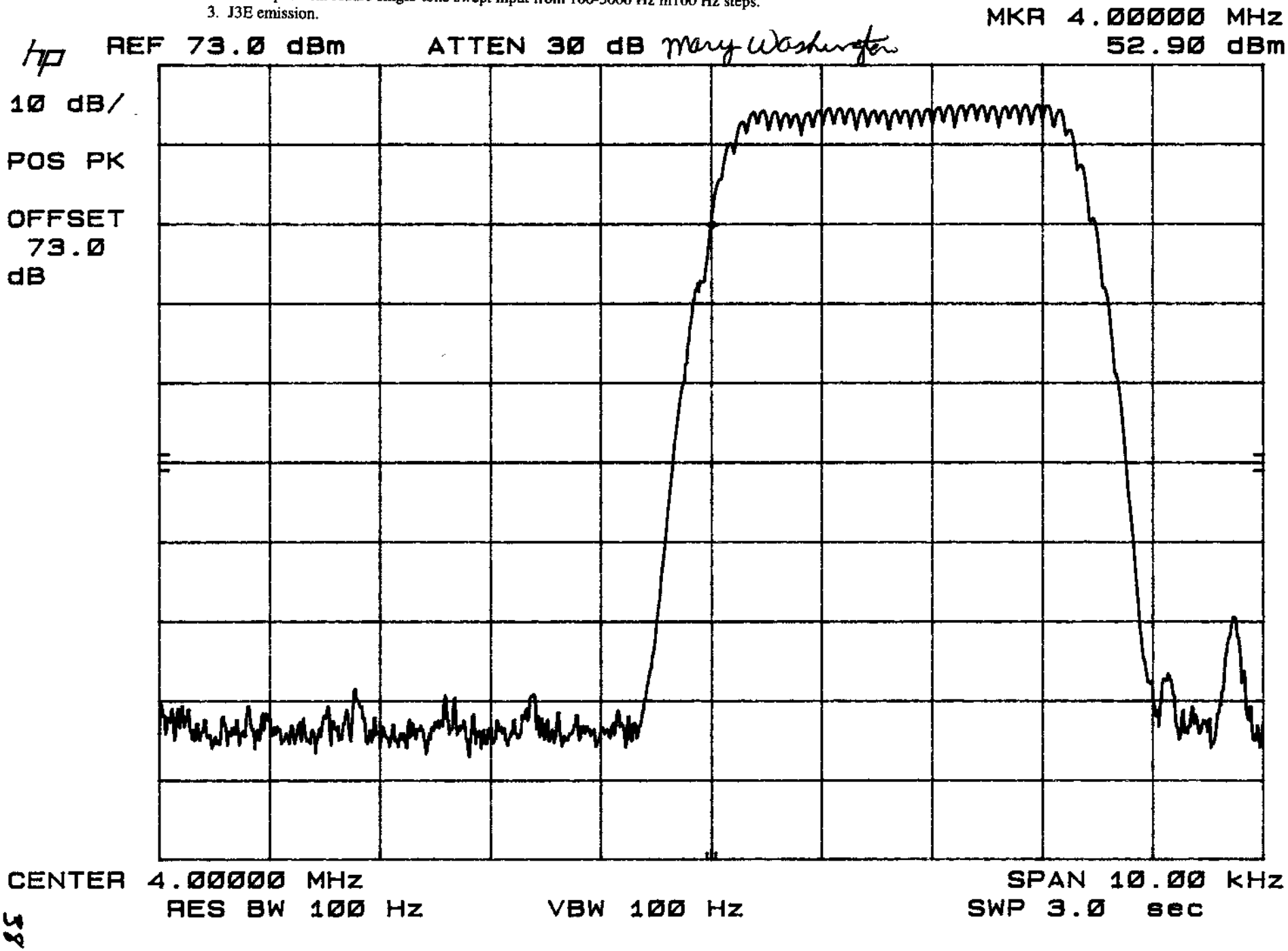
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. H3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. J3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. J3E emission.

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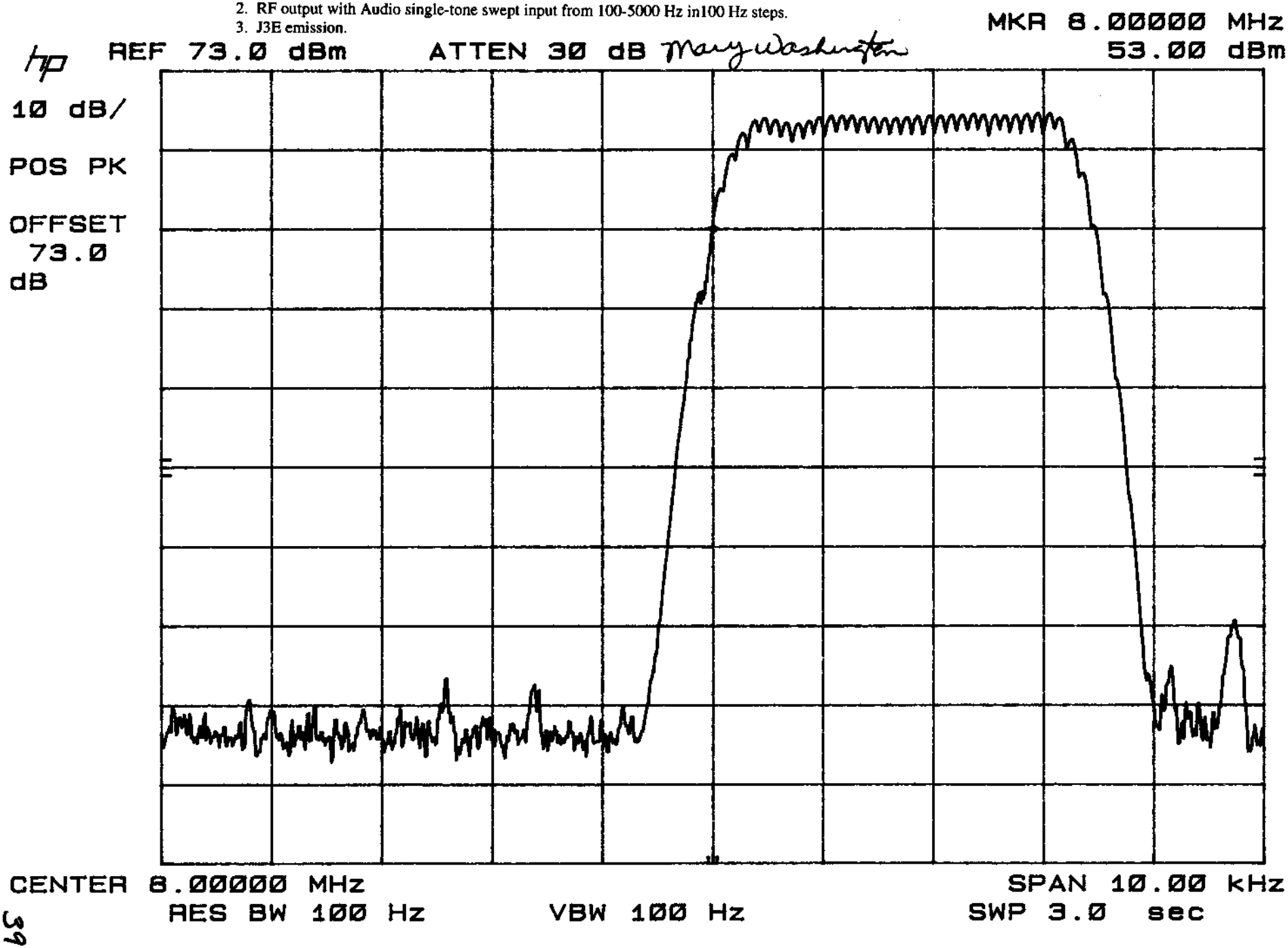
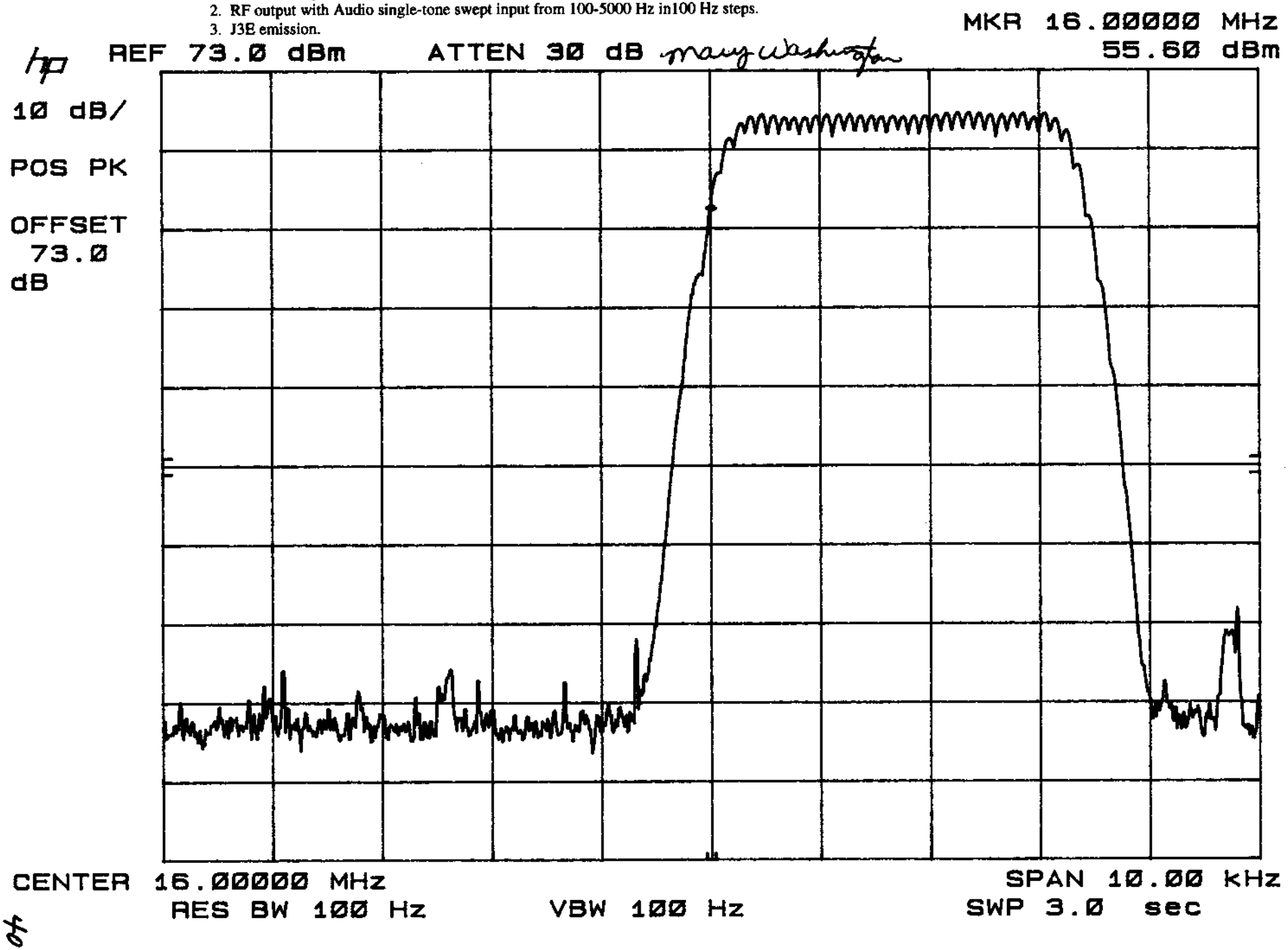
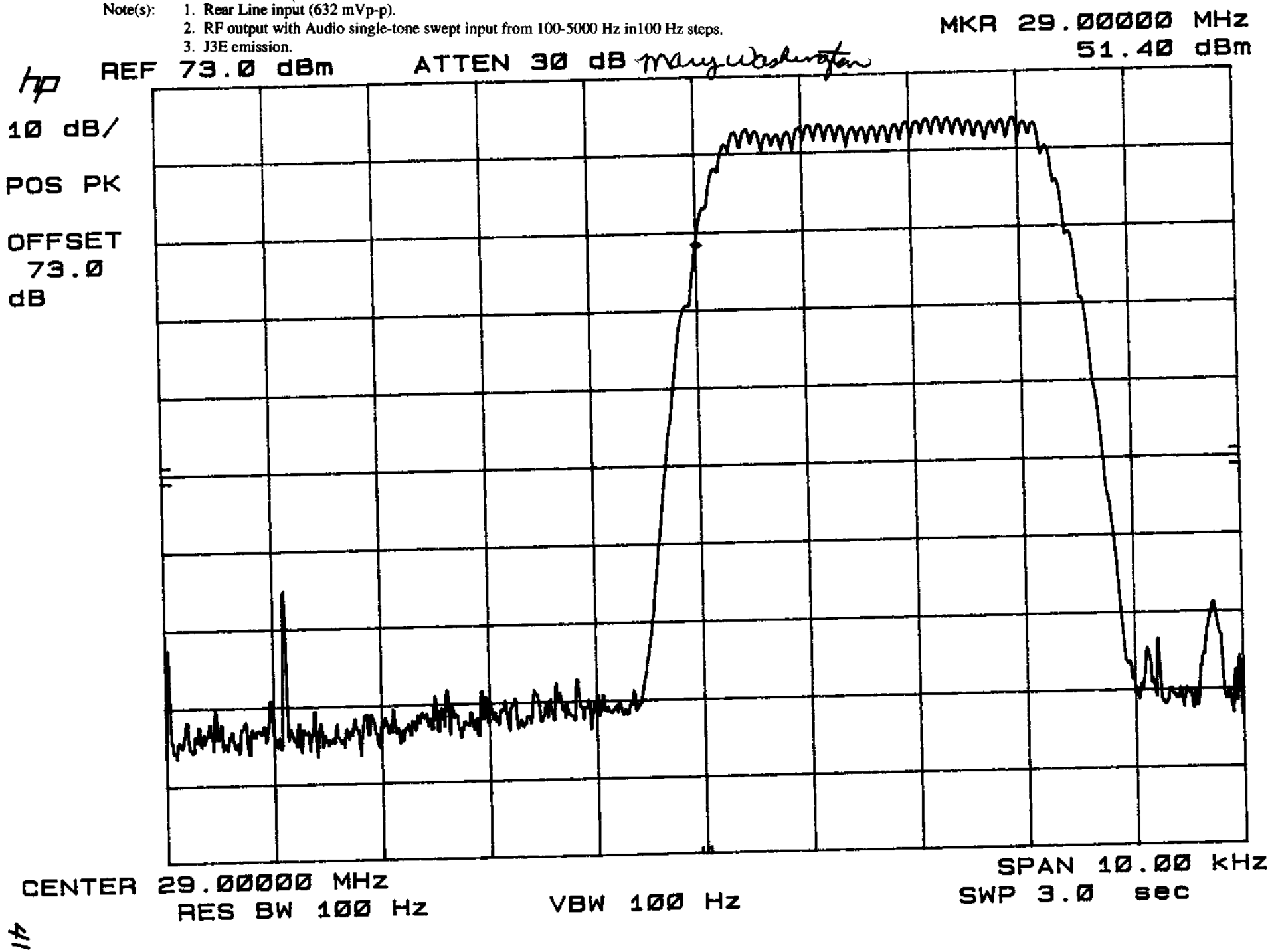
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. J3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. J3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87, Paragraph 87.141
Note(s): 1. Rear Line input (632 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in100 Hz steps.
3. J3E emission.

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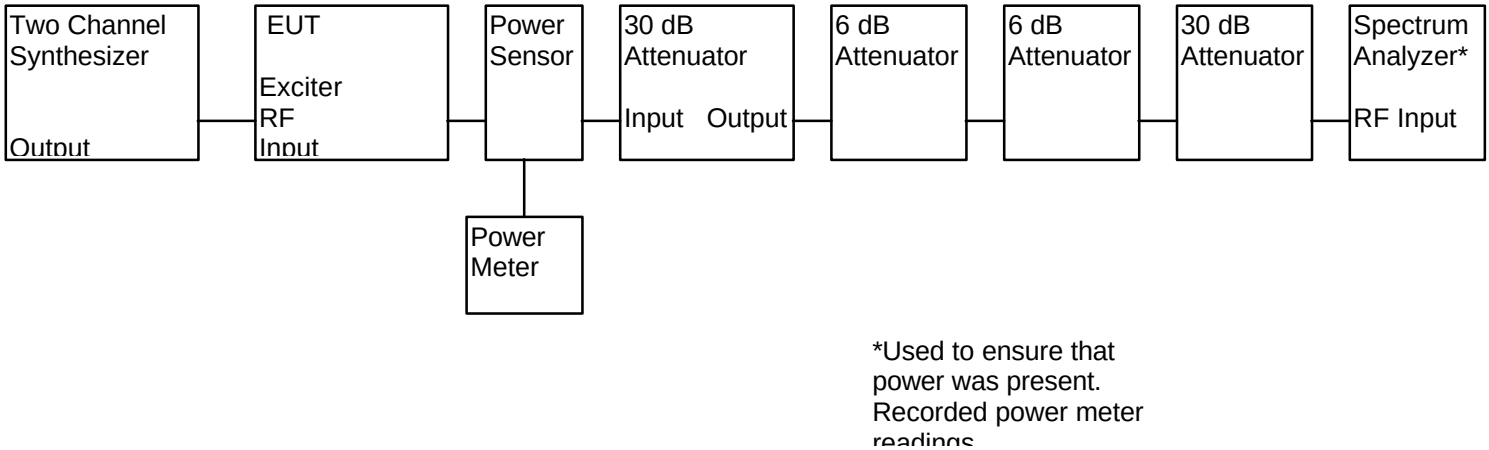
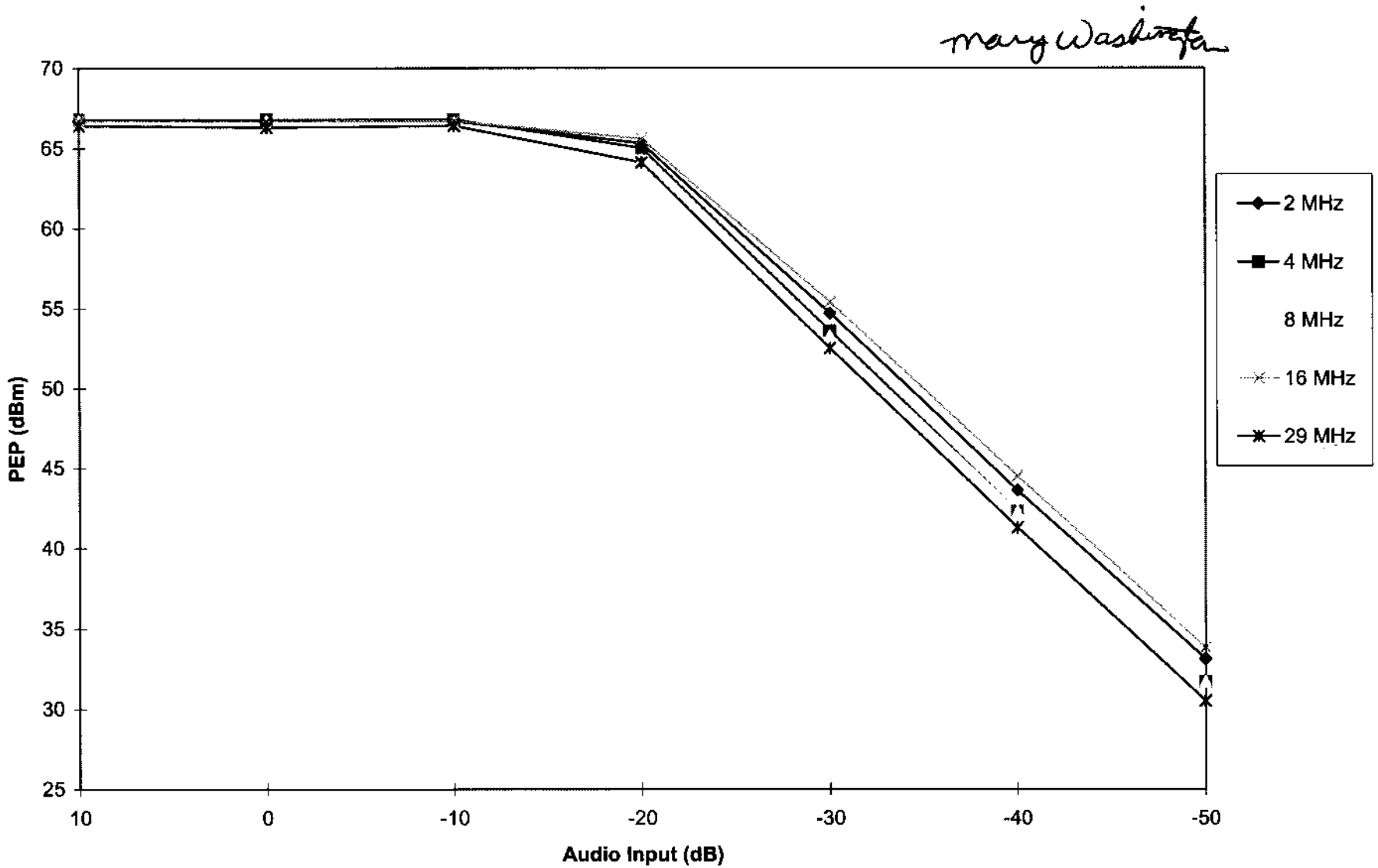
Test Setup for Rear Line Input (Part 2. 987(c), and Part 87, Paragraph 87.141)



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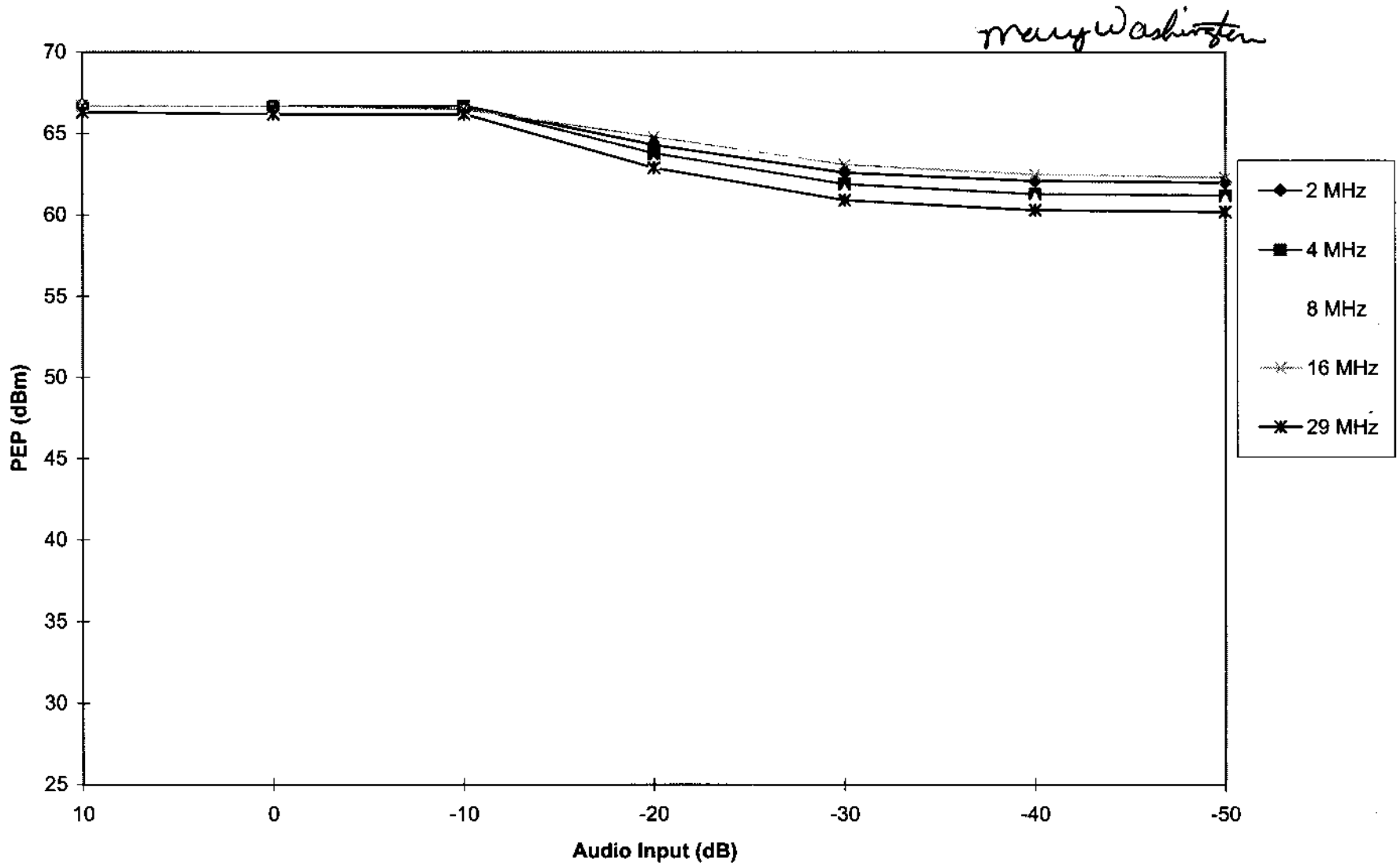
Rear Line Input( 632 mVp-p).
J3E emission.

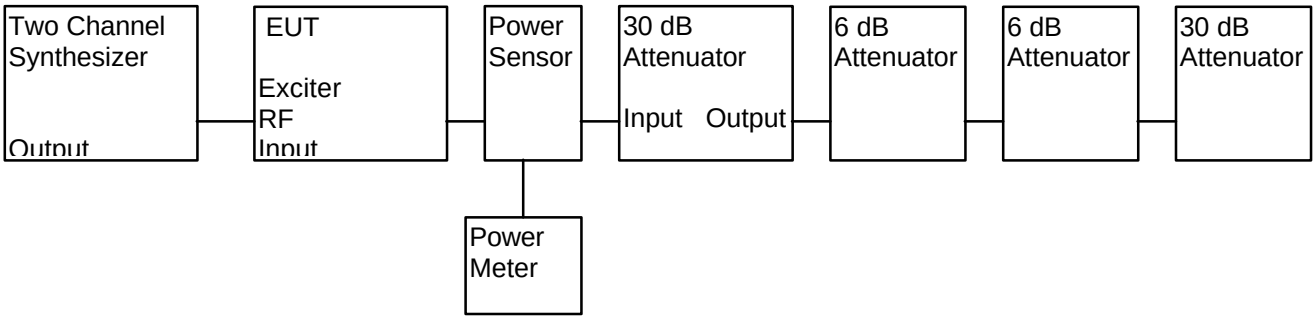
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(c) and Part 87, Paragraph 87.141
Note(s): Rear Line input (632 mVp-p).



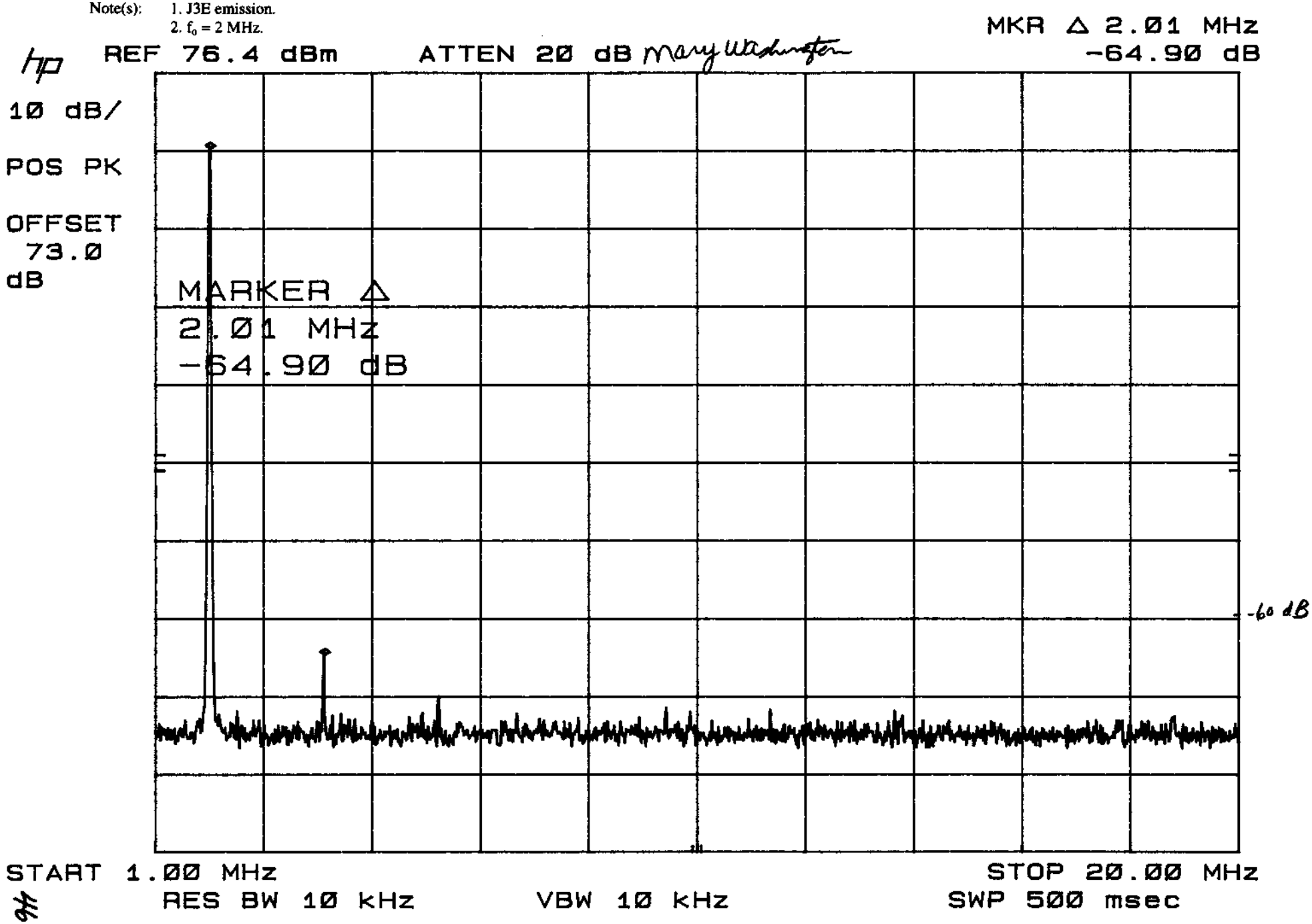

Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(c) and Part 87, Paragraph 87.141
Note(s): Rear Line input (632 mVp-p).

Rear Line Input( 632 mVp-p).
H3E emission.

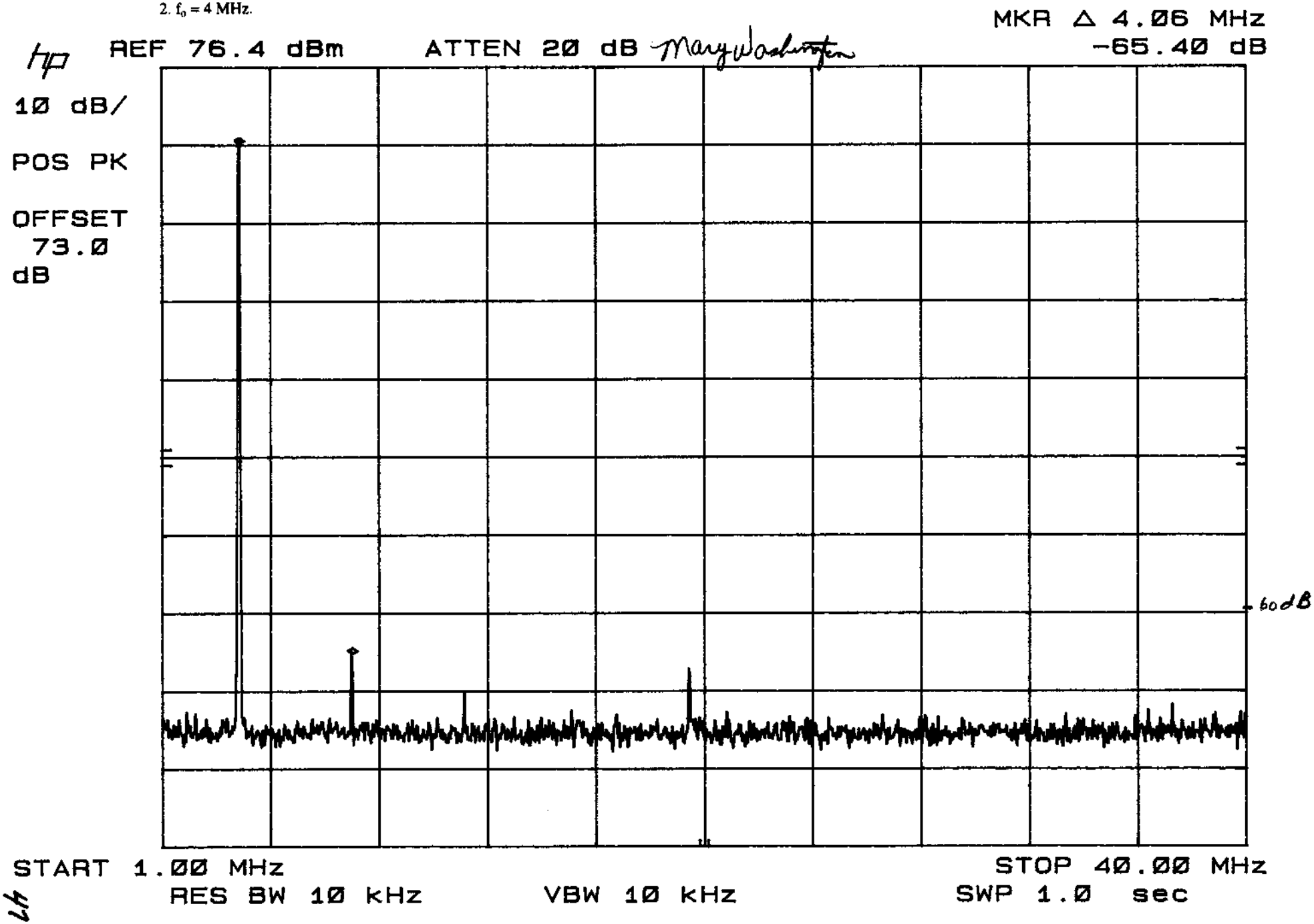
Test Setup for Spurious Emissions at Antenna Terminals (Part 2, Paragraph 2.991 and Part 87, Paragraph 87.139)



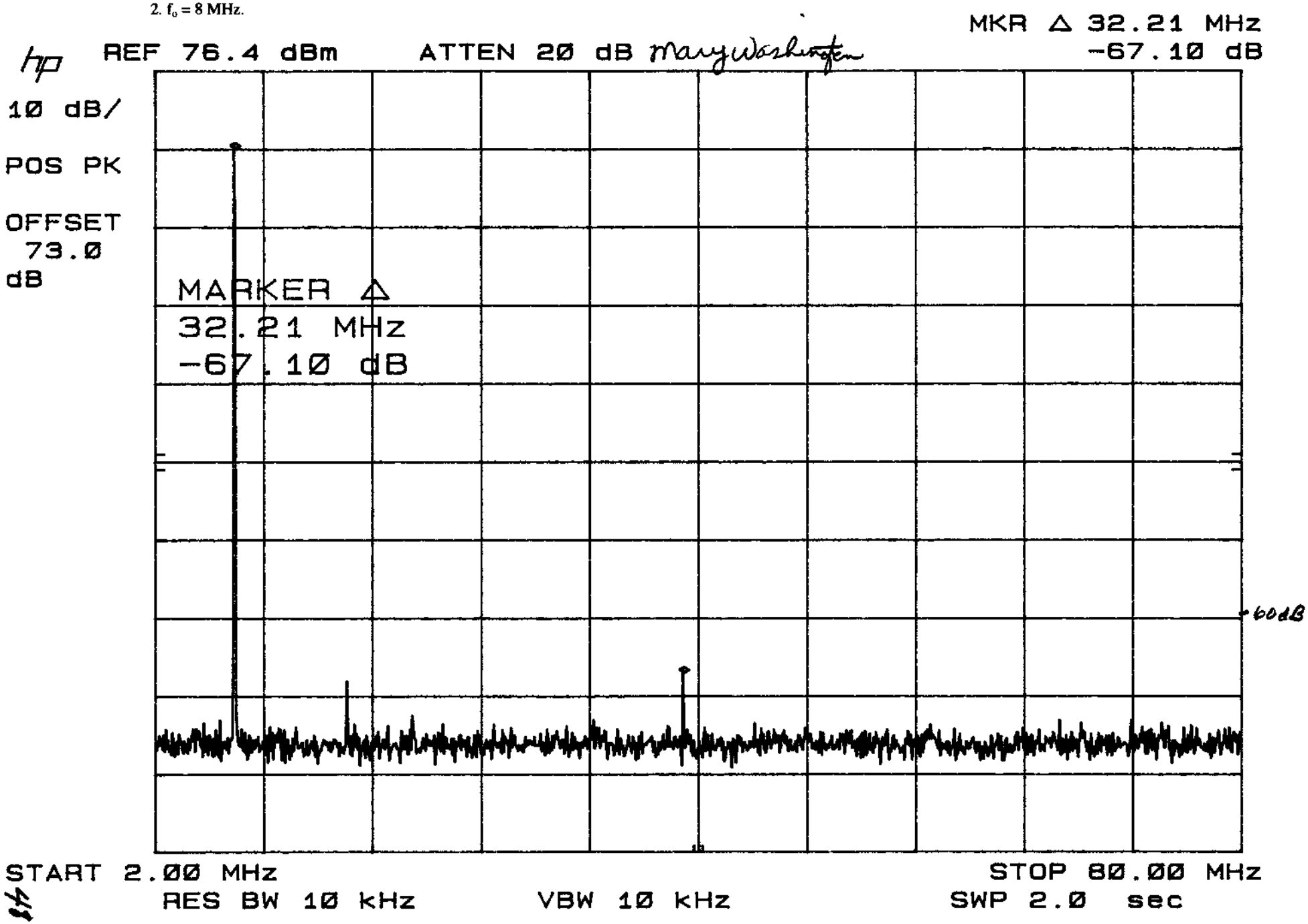
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Spurious Emissions at Antenna Terminals Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.991 and Part 87, Paragraph 87.139
Note(s): 1. J3E emission.
2. $f_o$ = 2 MHz.



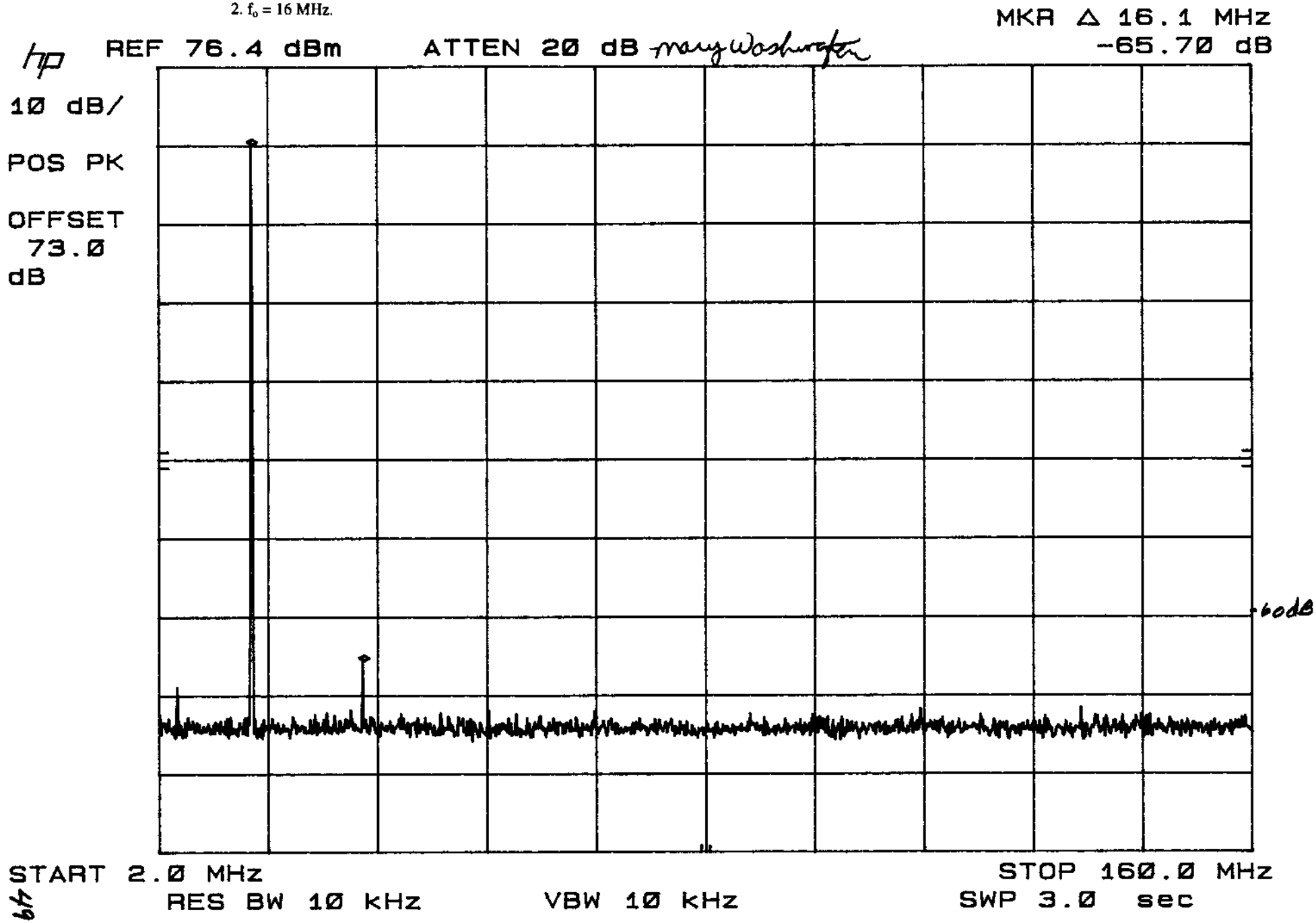
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Spurious Emissions at Antenna Terminals Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.991 and Part 87, Paragraph 87.139
Note(s): 1. J3E emission.
2. $f_o$ = 4 MHz.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Spurious Emissions at Antenna Terminals Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.991 and Part 87, Paragraph 87.139
Note(s): 1. J3E emission.
2. $f_o$ = 8 MHz.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Spurious Emissions at Antenna Terminals Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.991 and Part 87, Paragraph 87.139
Note(s): 1. J3E emission.
2. $f_o$ = 16 MHz.

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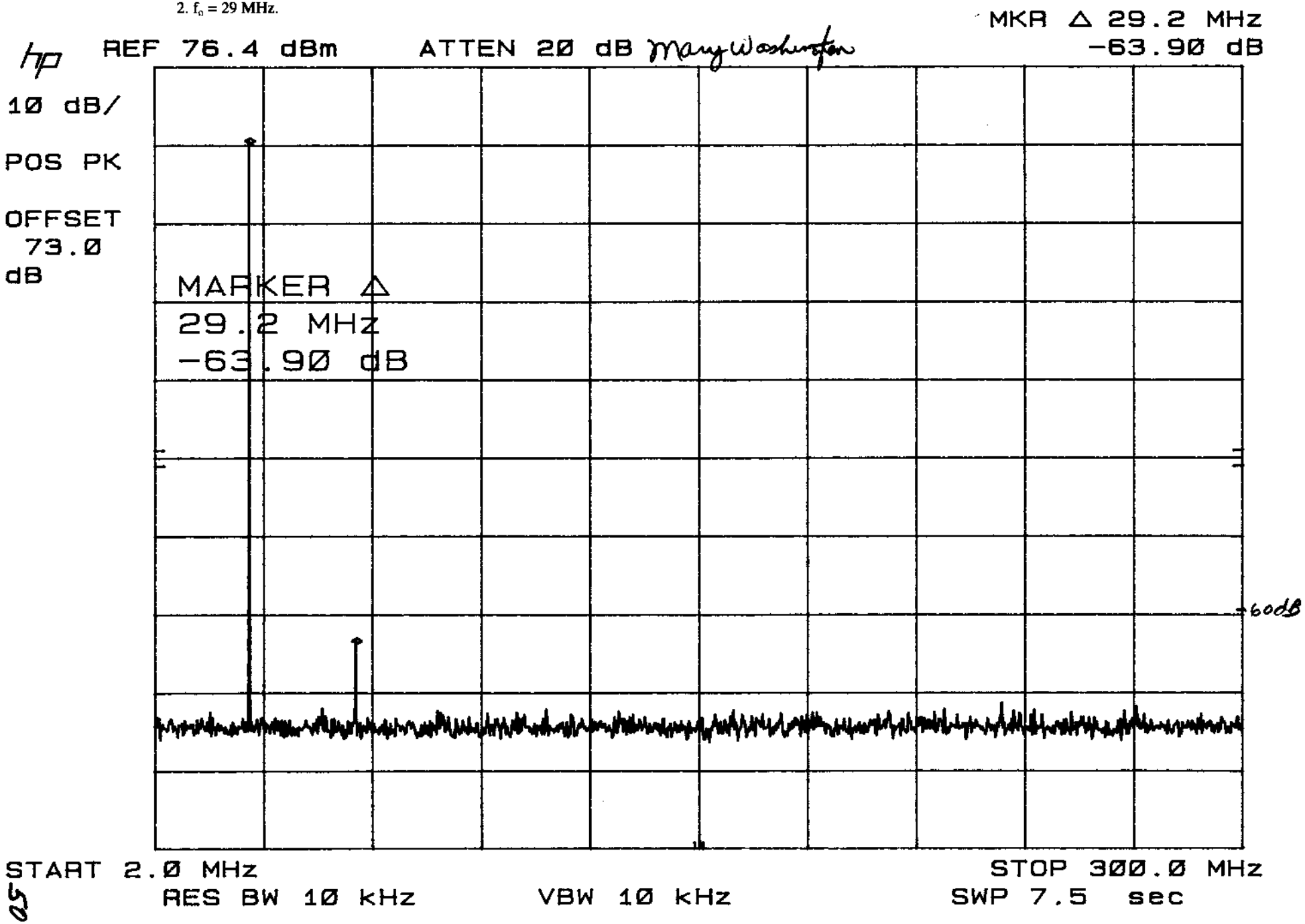
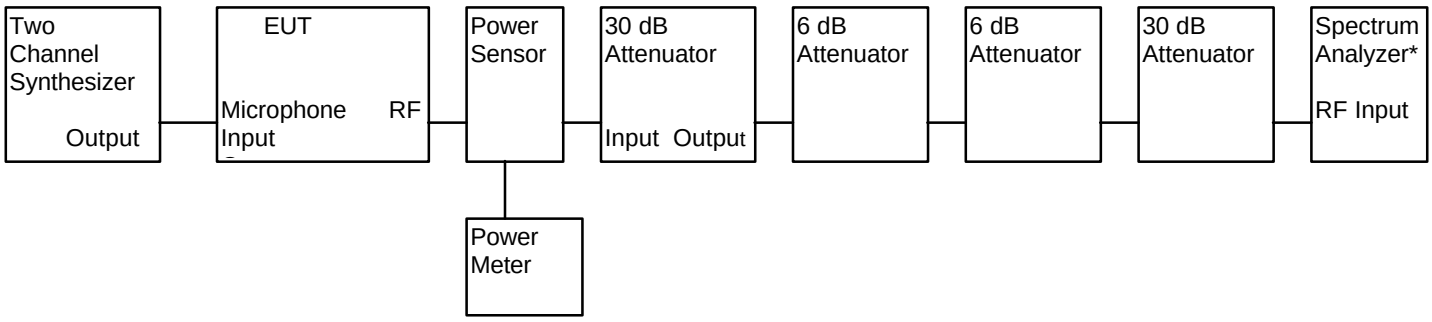
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Spurious Emissions at Antenna Terminals Date: December 15, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.991 and Part 87, Paragraph 87.139
Note(s): 1. J3E emission.
2. $f_o$ = 29 MHz.

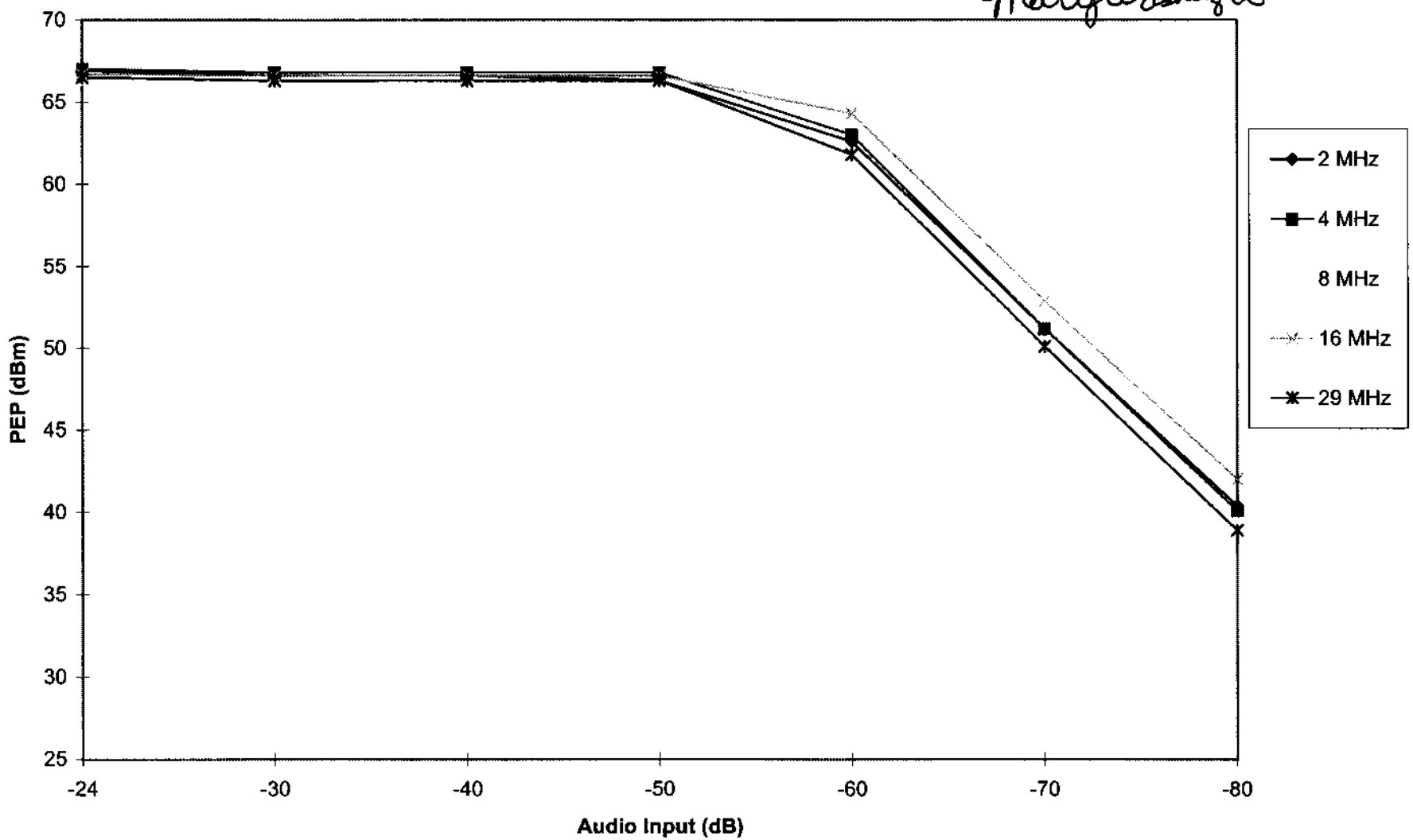


Test Setup for Microphone Input (Part 2, Paragraph 2.987(c))




*Used to ensure that power was present. Recorded power meter readings

Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(c) and Part 87, Paragraph 87.141
Note(s): Microphone input (20 mVp-p).

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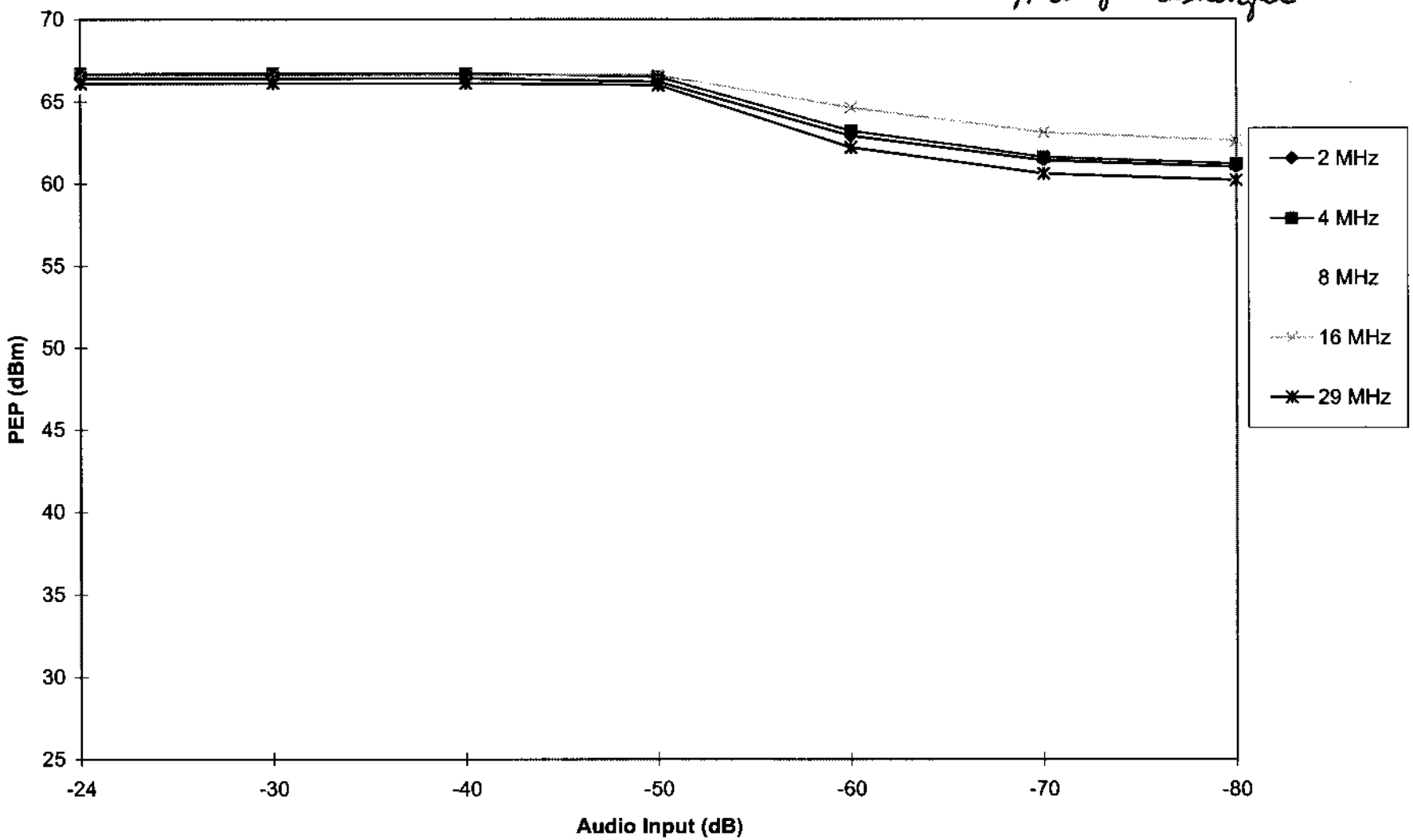
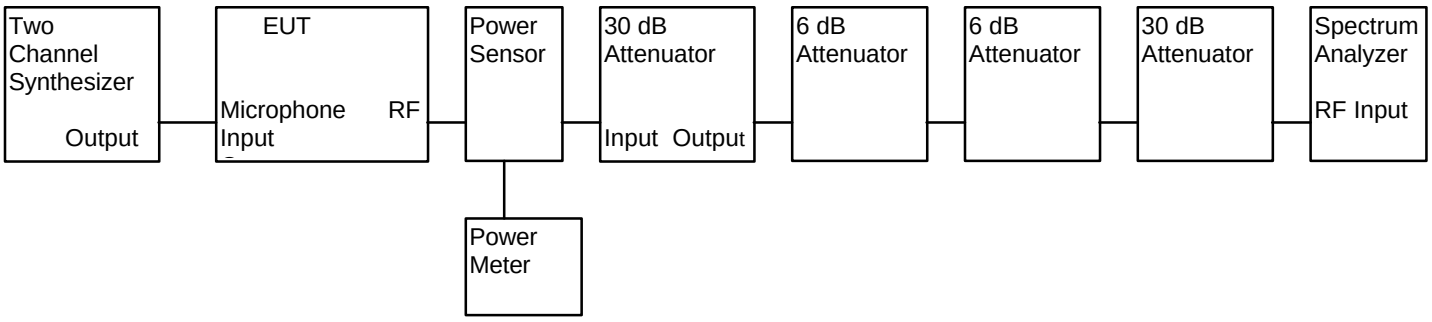
Microphone Input( 20 mVp-p).
J3E emission.

Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(c) and Part 87, Paragraph 87.141
Note(s): Microphone input (20 mVp-p).

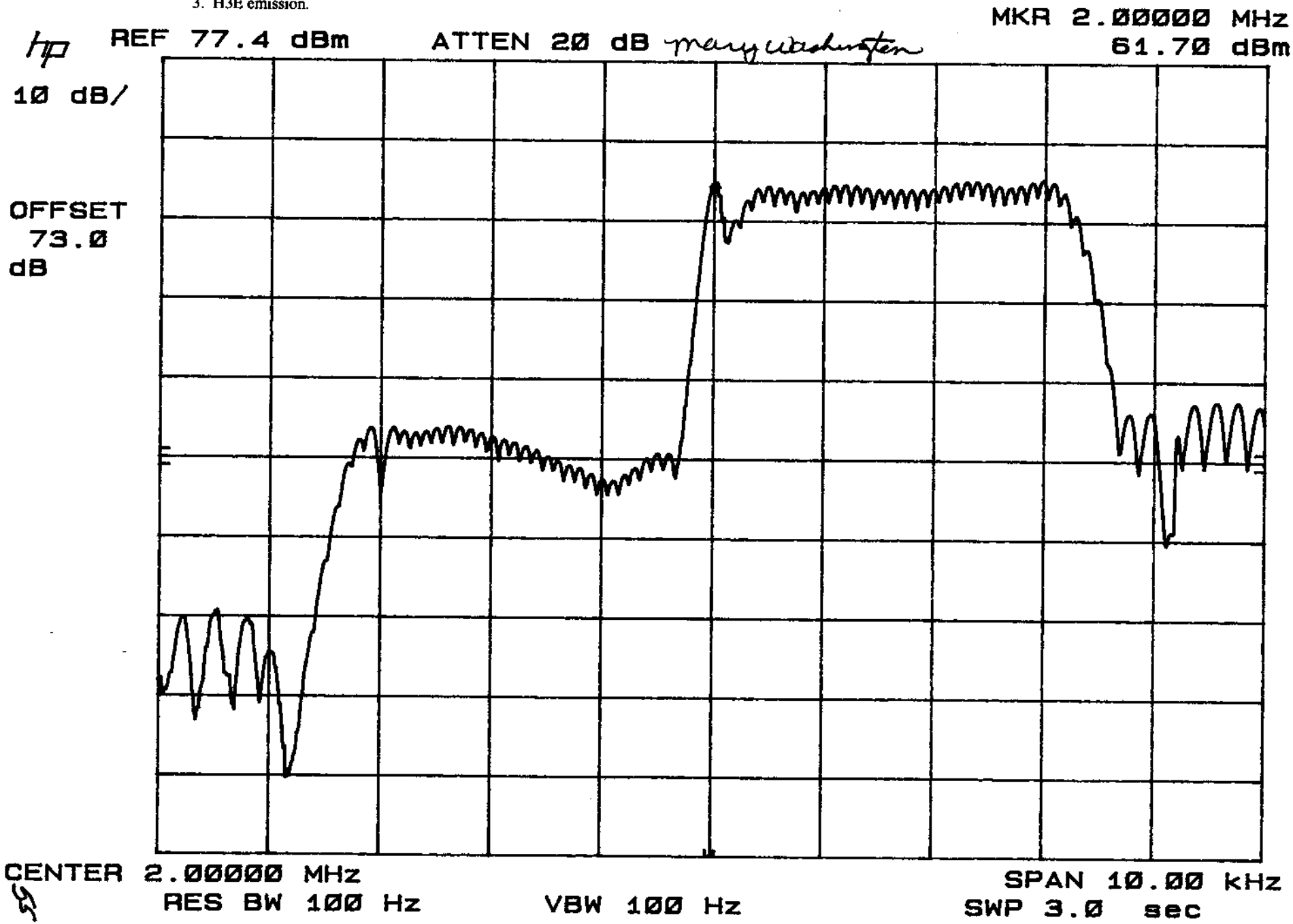



Microphone Input( 20 mVp-p).
H3E emission.

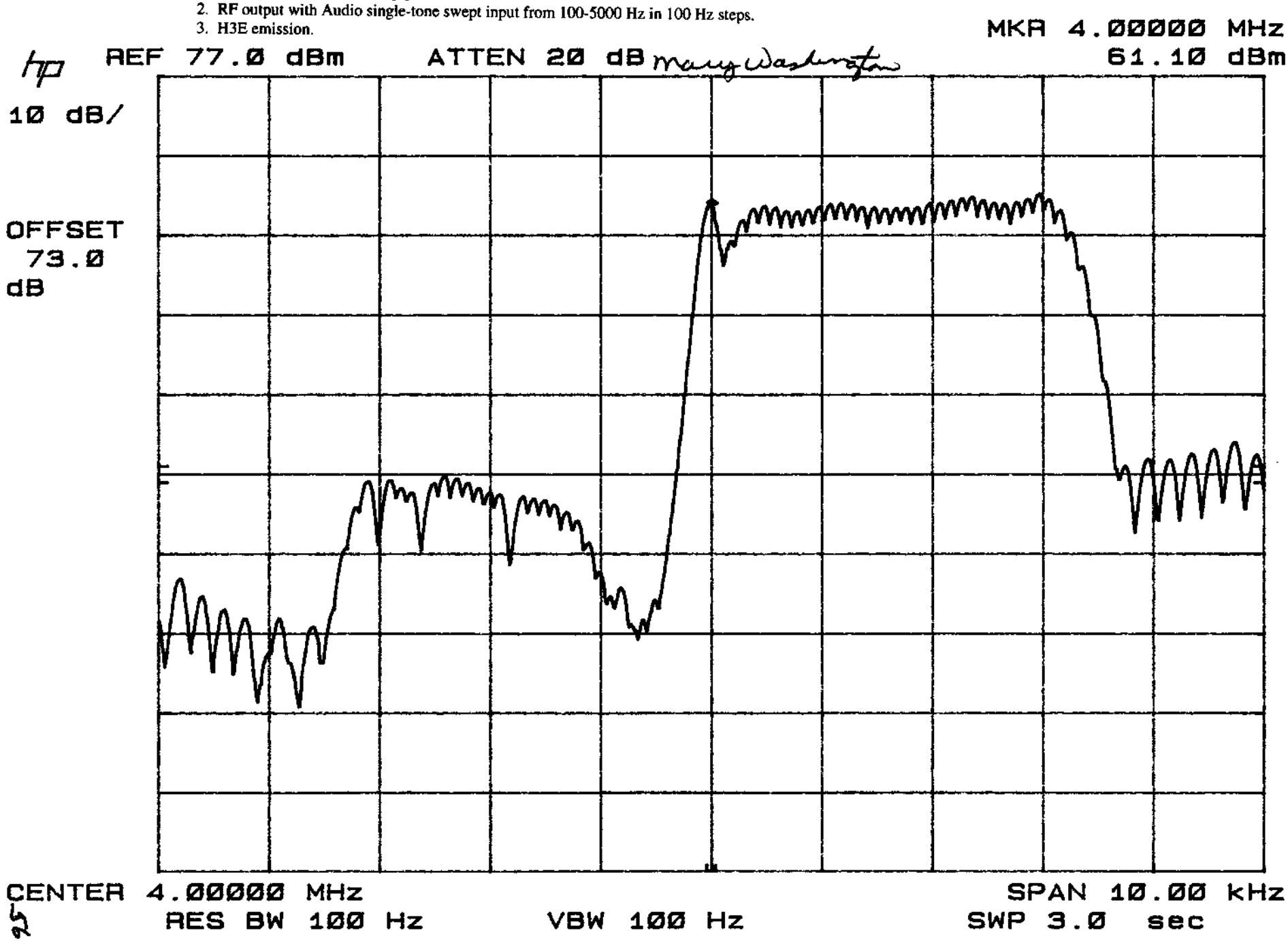
Test Setup for Microphone Input  (Part 2, Paragraph 2.987(a))



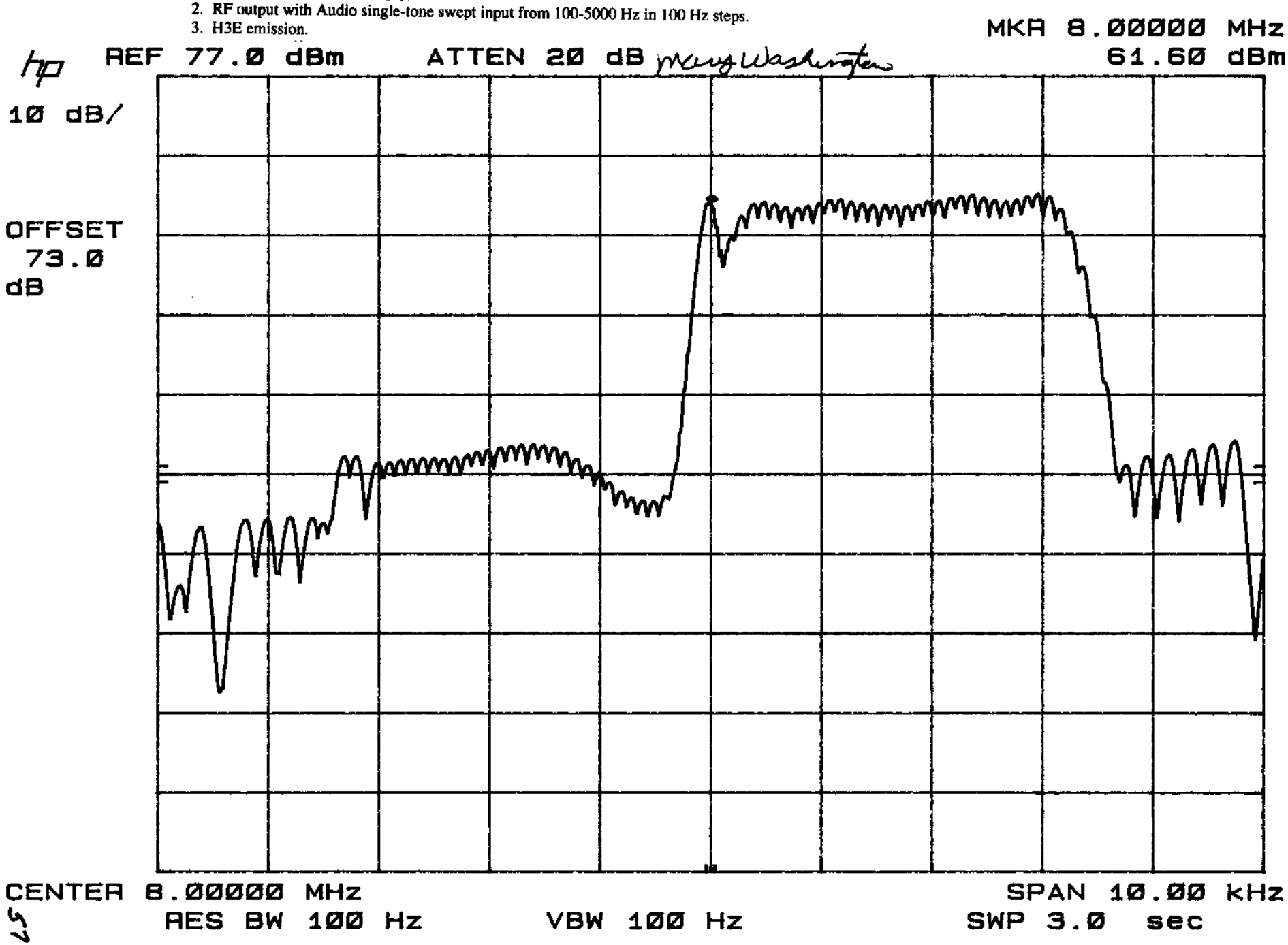
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. H3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. H3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. H3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
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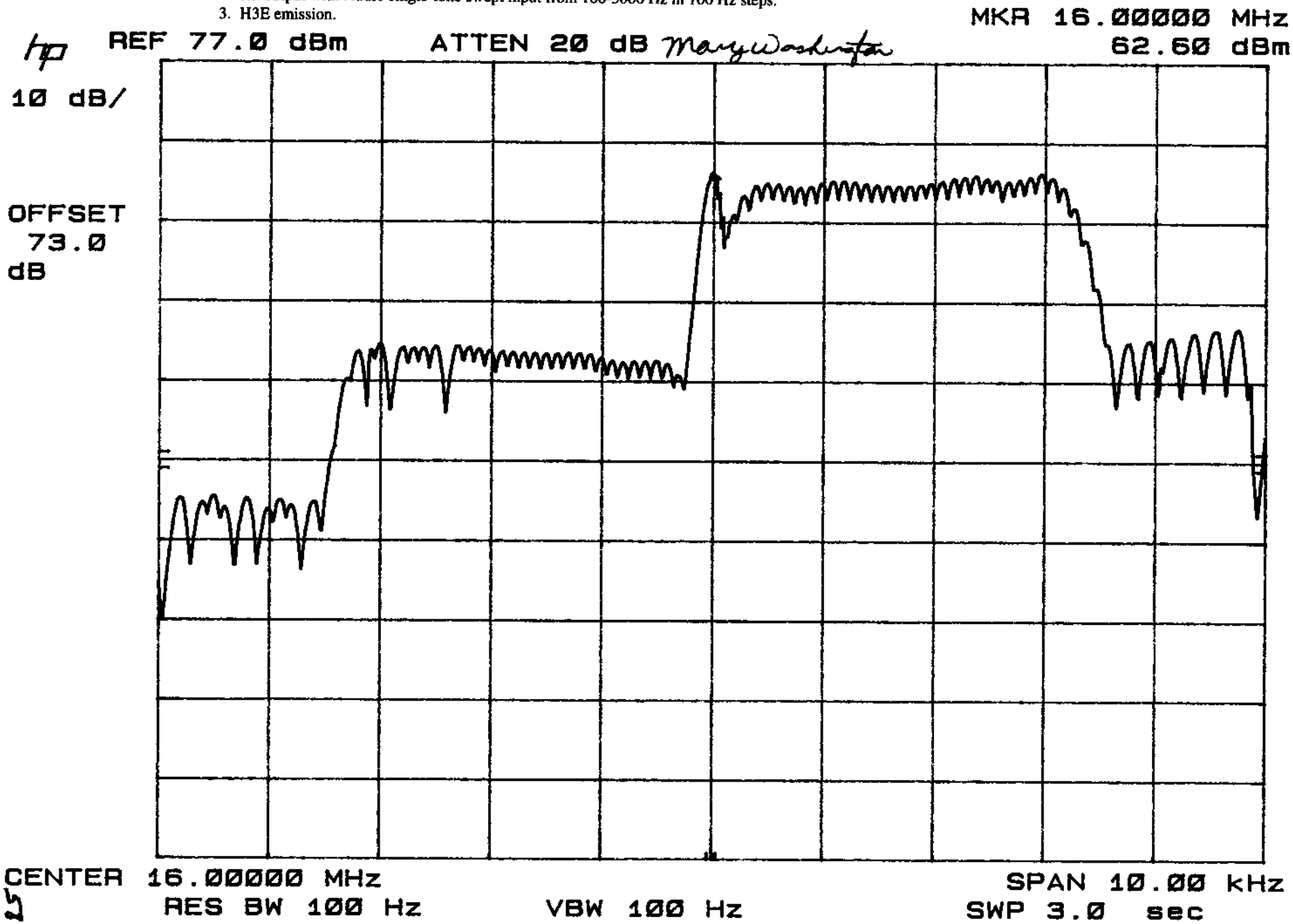
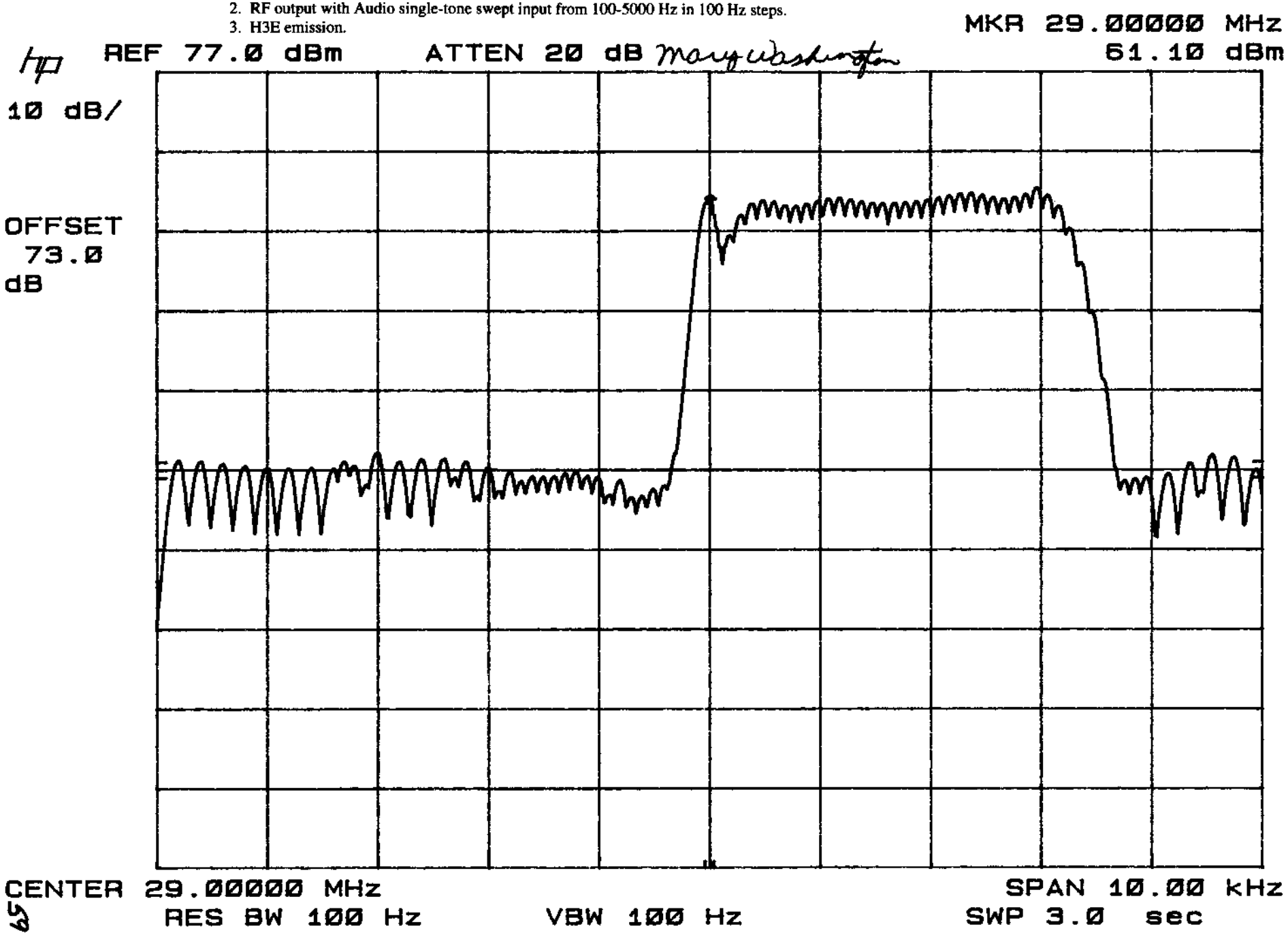


Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. H3E emission.

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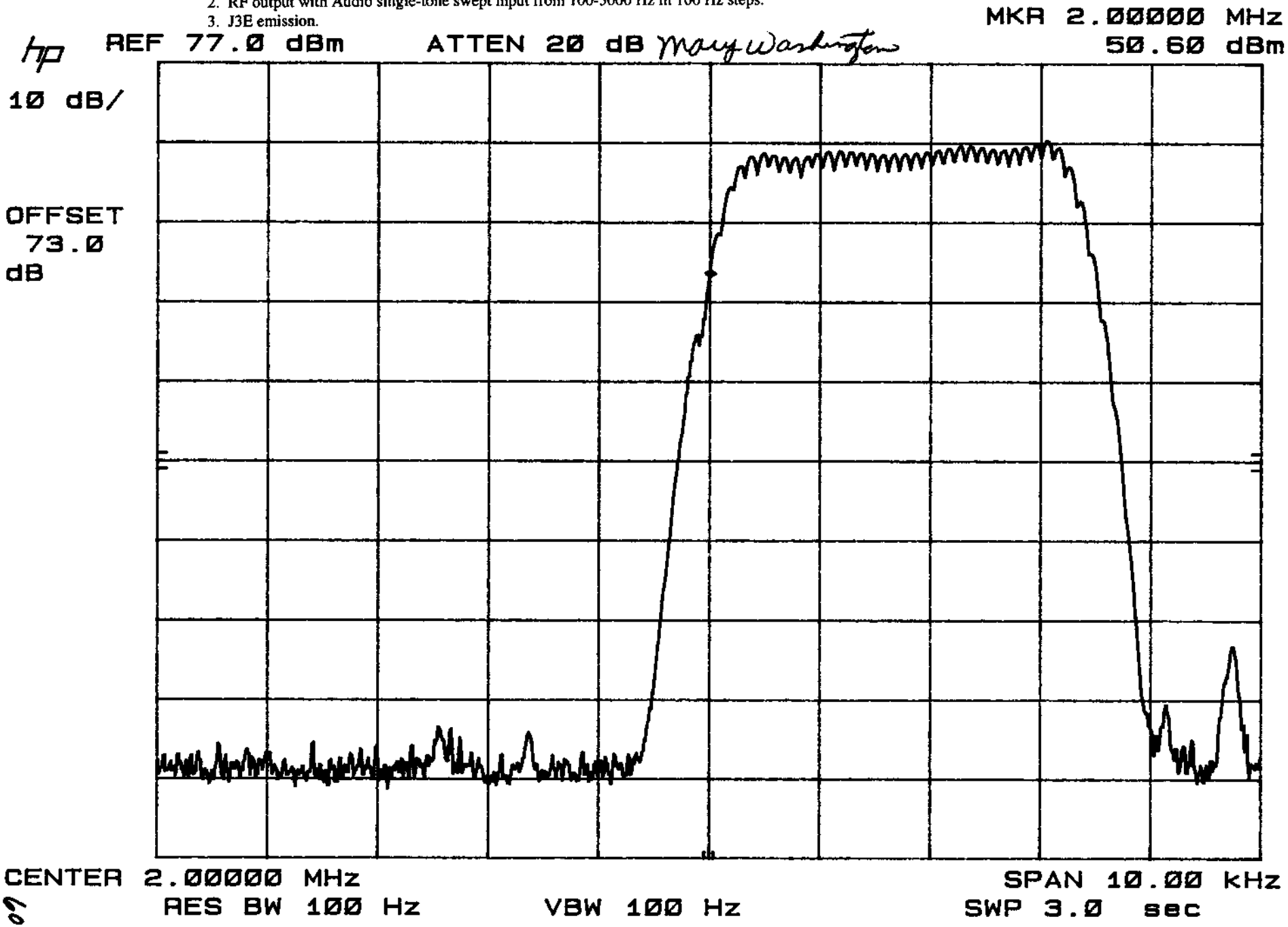
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. J3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
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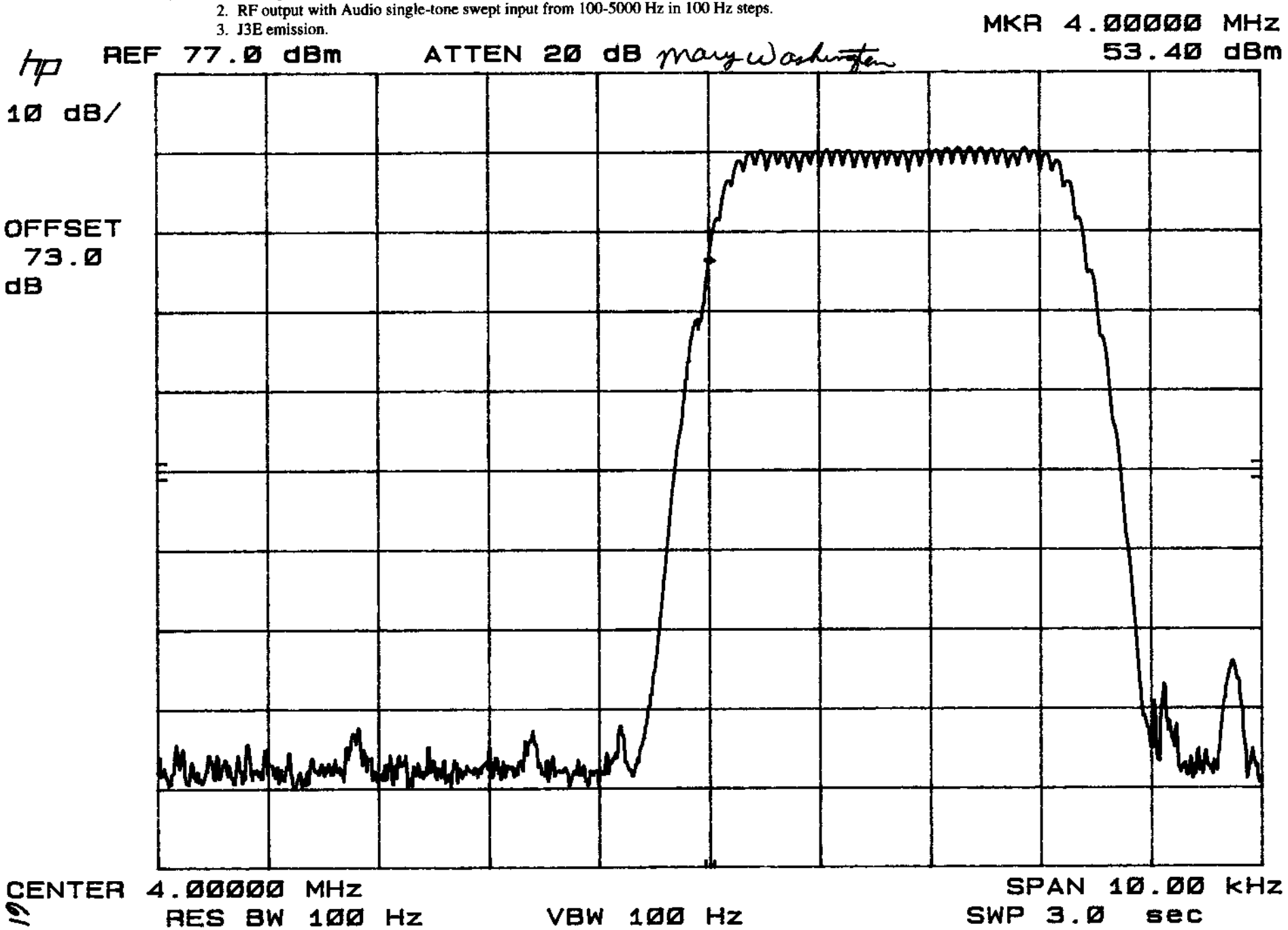
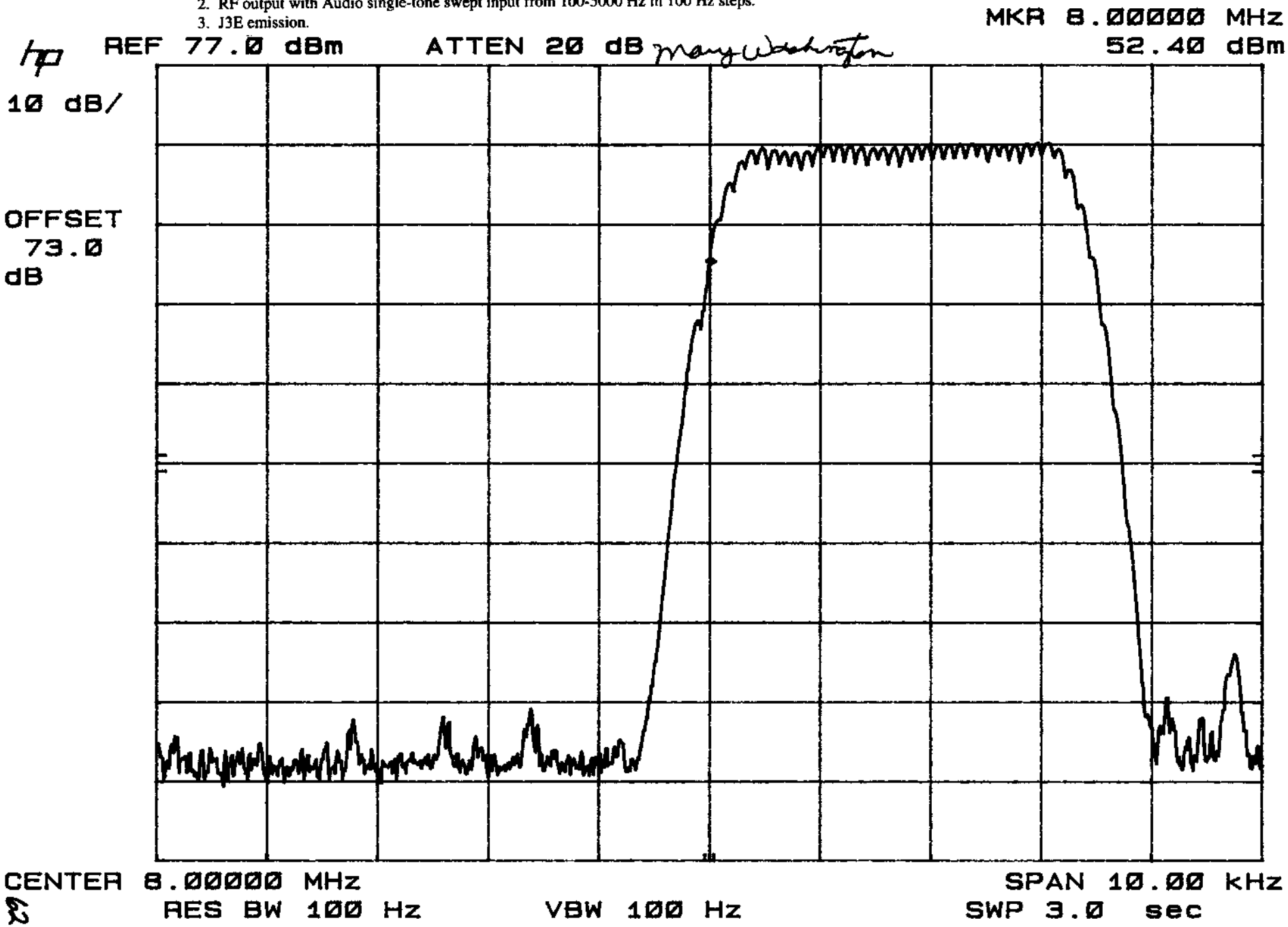
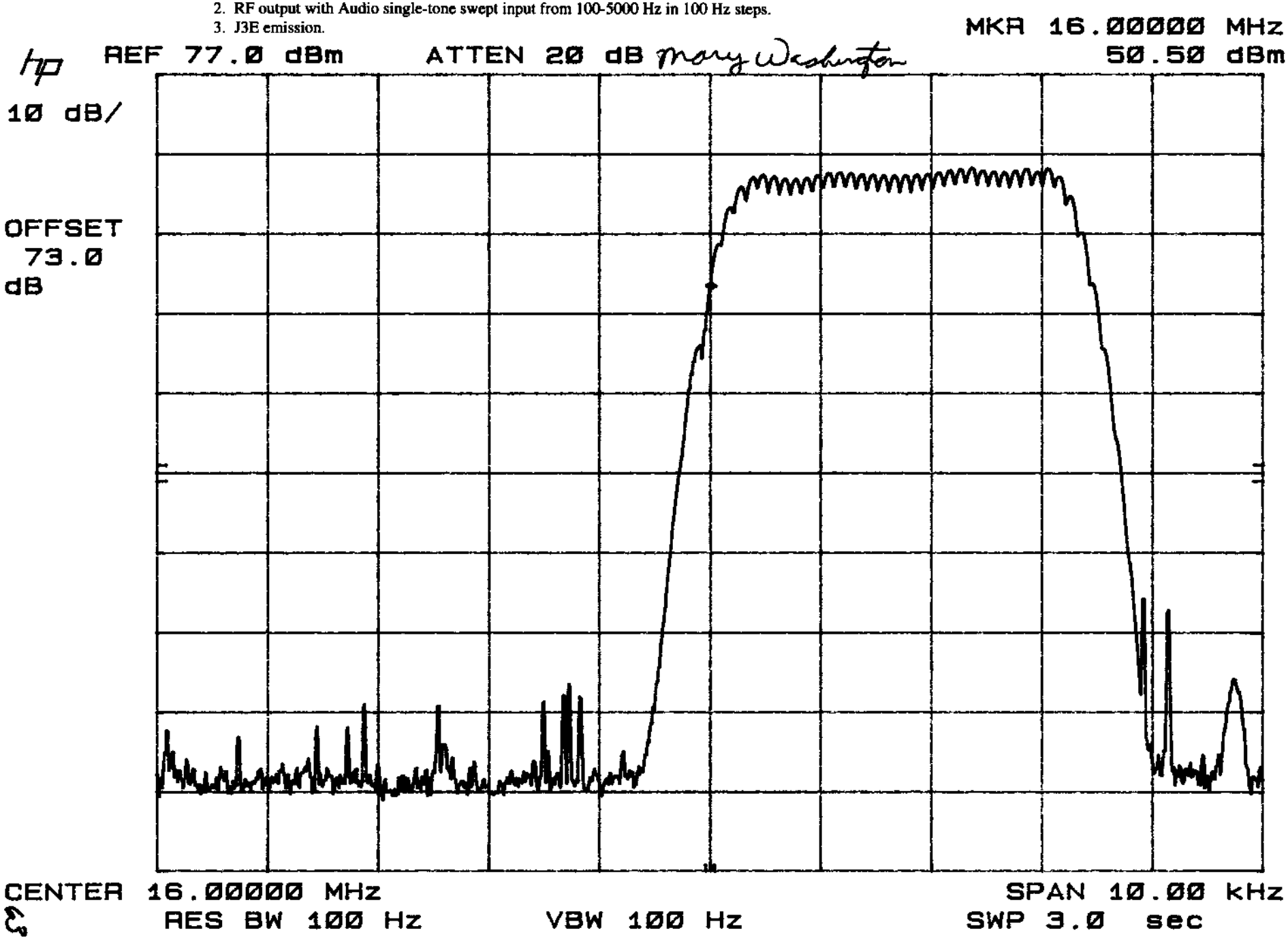


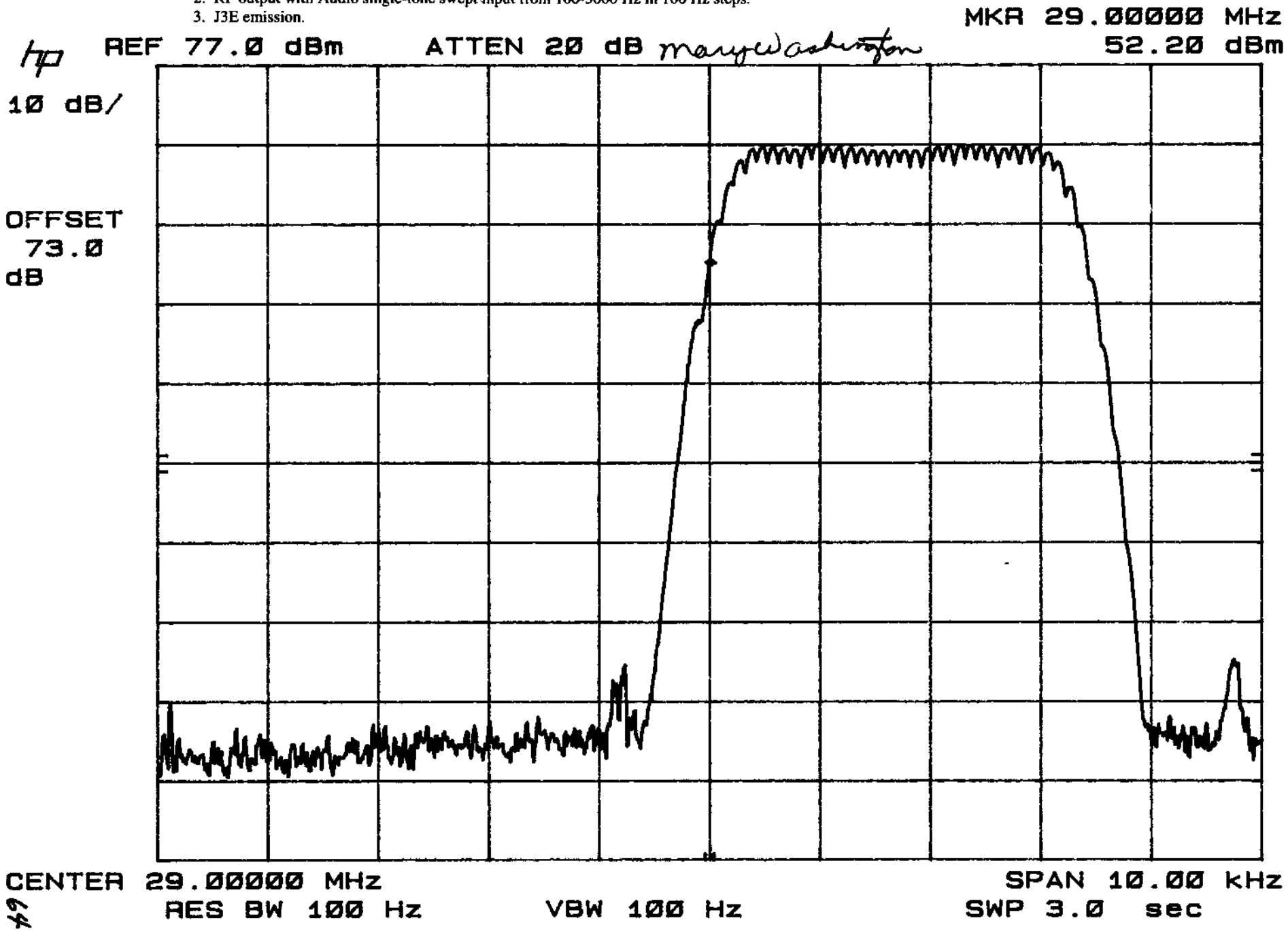
Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. J3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. J3E emission.



Customer: Cubic Communications, Inc. EUT: CTX-5000 5 kW HF Transmitter
Test: Modulation Characteristics Date: December 16, 1998 Report No.: S8597
Specification: FCC Part 2, Paragraph 2.987(a) and Part 87 Paragraph 87.141
Note(s): 1. Microphone input (20 mVp-p).
2. RF output with Audio single-tone swept input from 100-5000 Hz in 100 Hz steps.
3. J3E emission.

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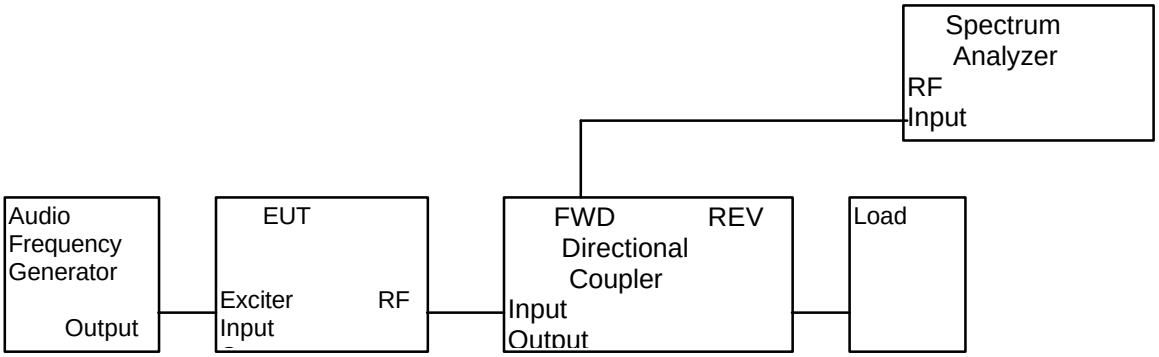
Equipment list for Occupied Bandwidth

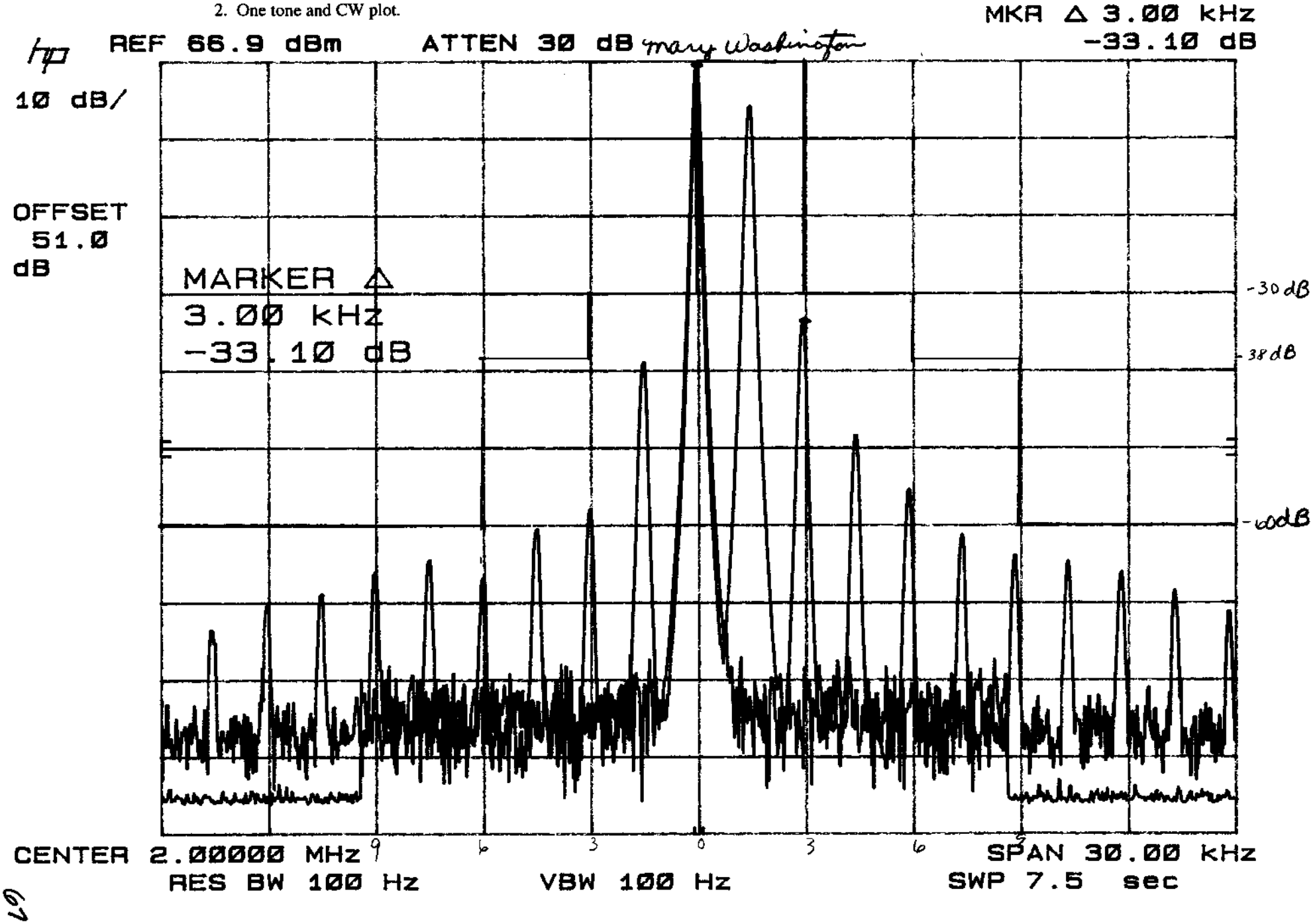
20 dB Attenuator, P/N 589 and 590
Spectrum Analyzer
Audio Frequency Generator
Directional Coupler
Coaxial Attenuator, Model 8329-30, s/N 4414, Bird Electronic Corporation

HP 85662A, Display 3001A18426, Cal Date 9/23/99
Spectrum Analyzer HP8568B, 2928A04873, Cal Date 9/23/99
20 dB Attenuator, Pastemack 7010-20
Directional Coupler, Werlatone, Model G5444, Cal Date 6/10/99
RF Power Meter, Bird Electronics Corp., Model 4421, S/N 0141, NCR
Power Sensor, Bird Electronics Corp., Model 4024, S/N 8032, Cal Date 6/16/99
Tenuline coaxial Attenuator (30 dB), Bird Electronics Corp., Model 8329-300, S/N 1593, NCR
Two Channel synthesizer, HP, 83326A, S/N 2437A00156, Cal Date 09/15/99
Audio Synthesizer Telulex, Model SG-100, Cal Date 10/06/99

Test Setup for FCC Part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3), Occupied Bandwidth
Test Setup for December Test Dates

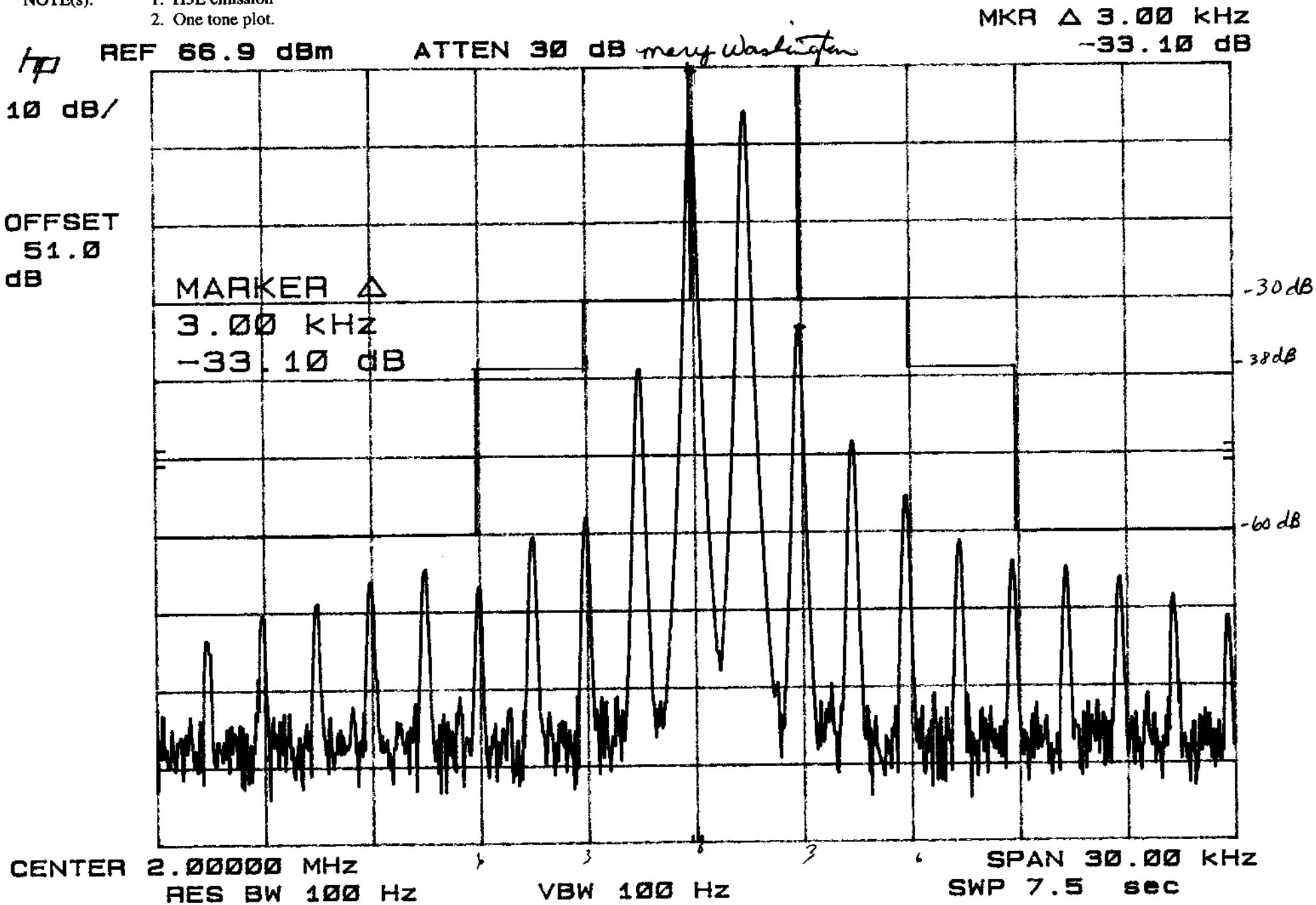


EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone and CW plot.



EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone plot.

DATE: December 14, 1998
TEST: Occupied Bandwidth

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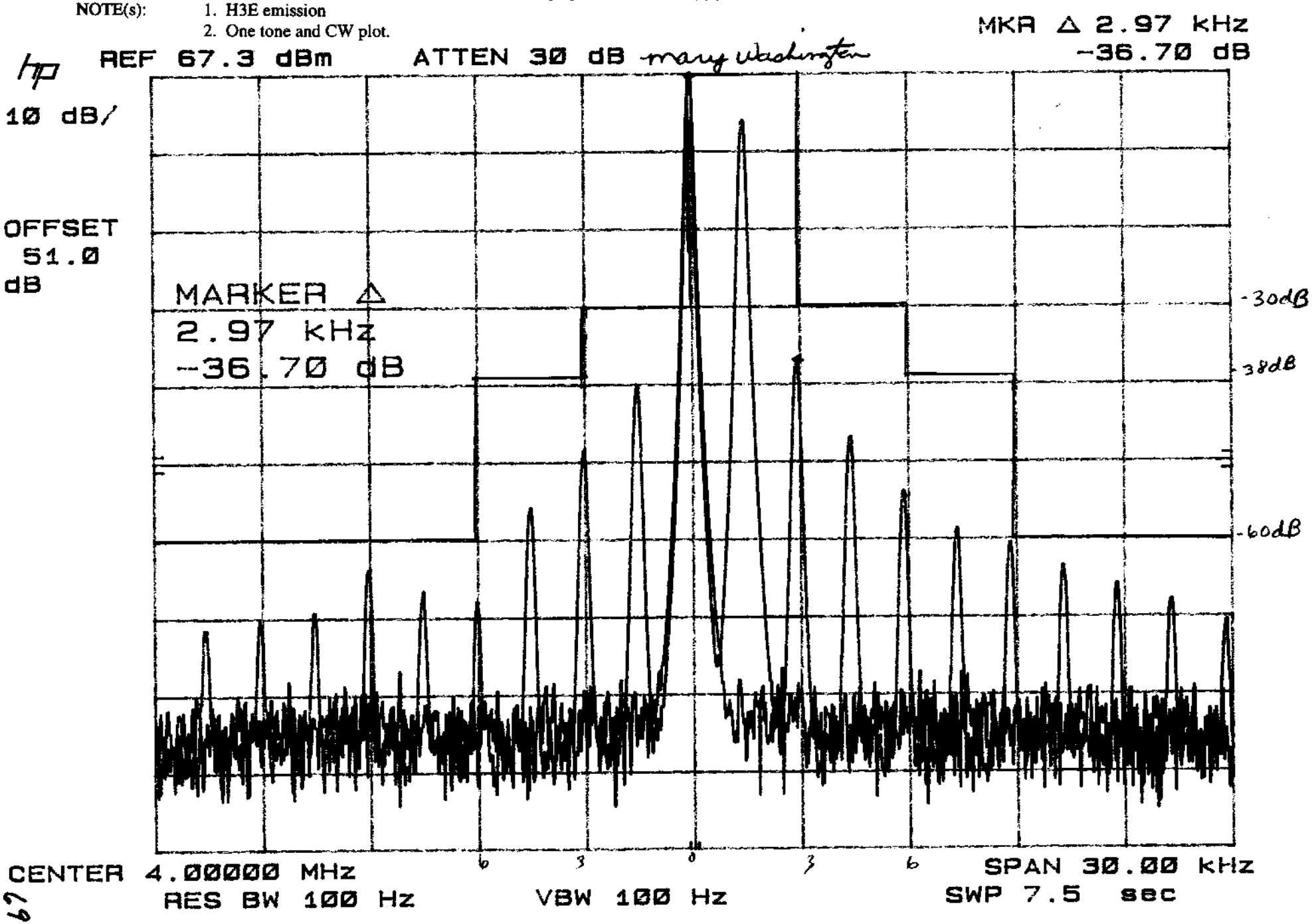
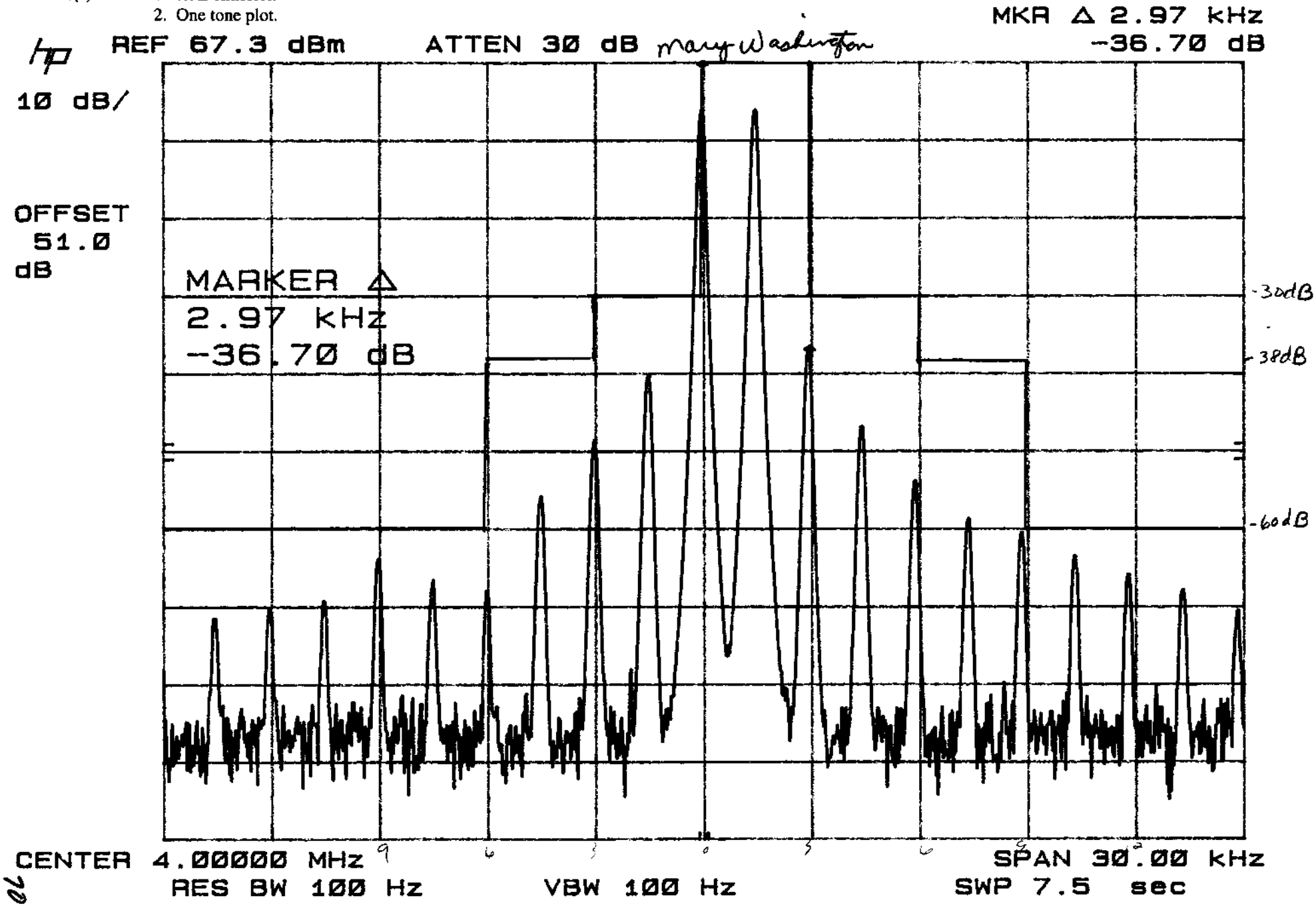
EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone and CW plot.

DATE: December 14, 1998
TEST: Occupied Bandwidth

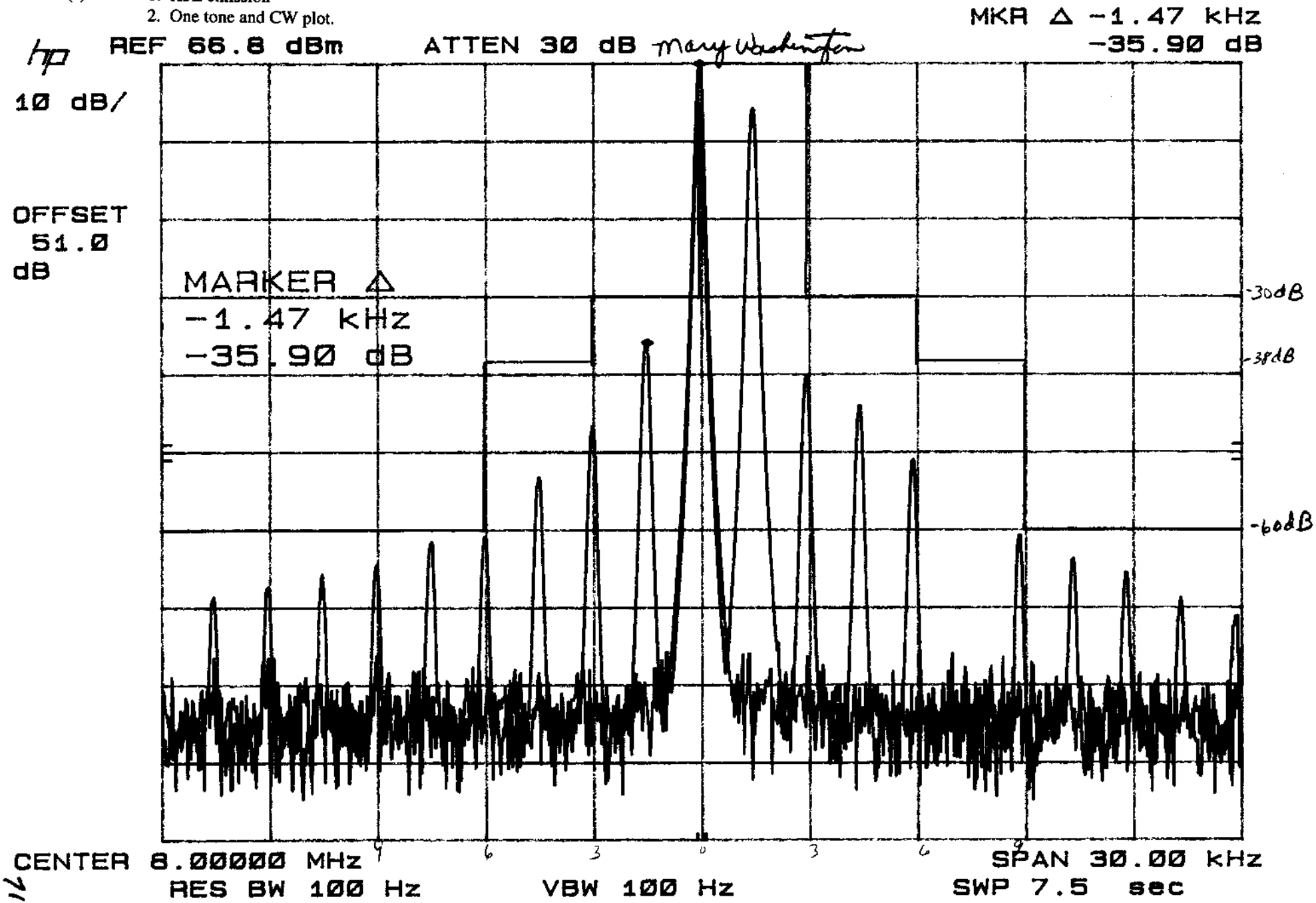



67

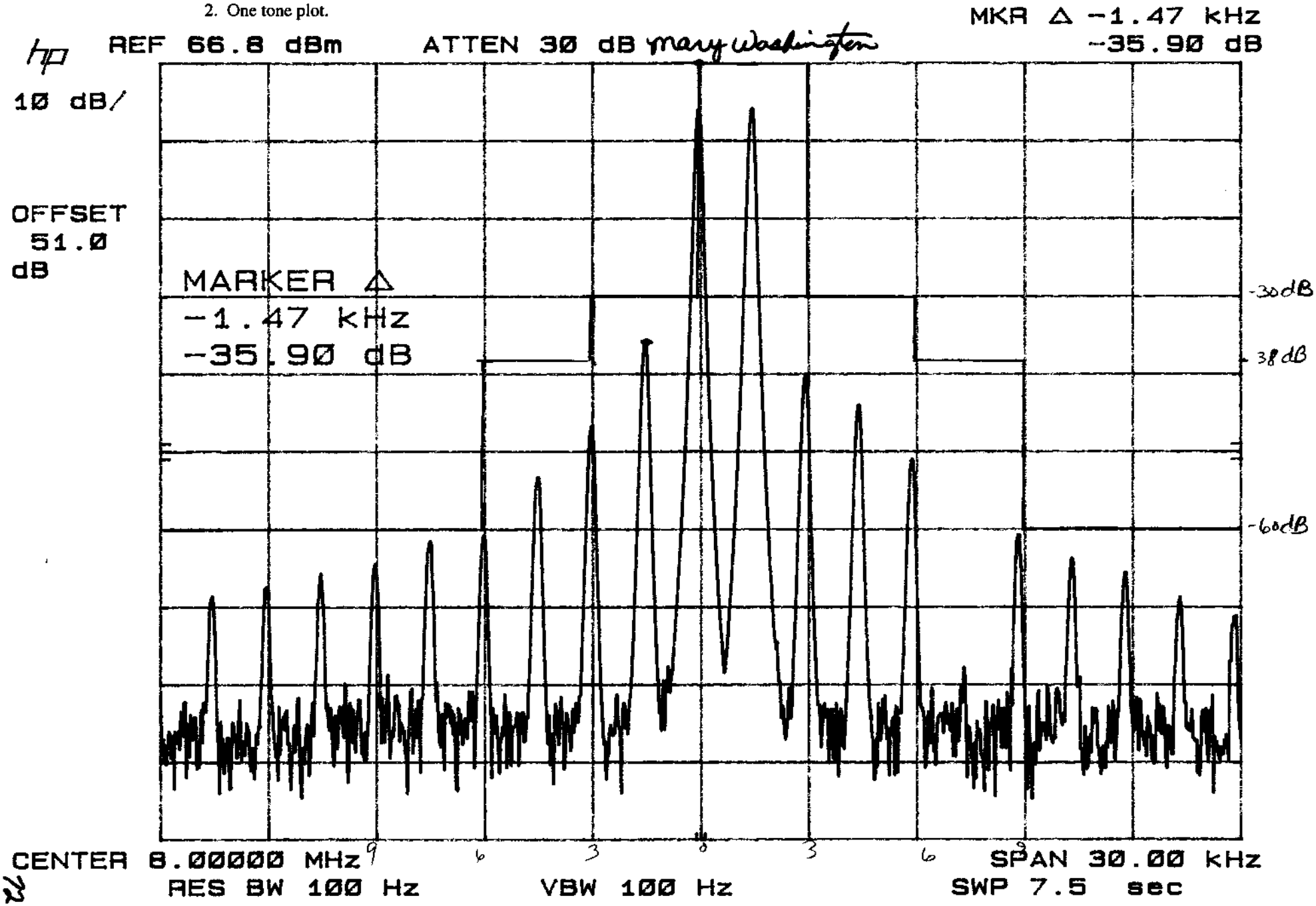
EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone plot.



EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
DATE: December 14, 1998
TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone and CW plot.



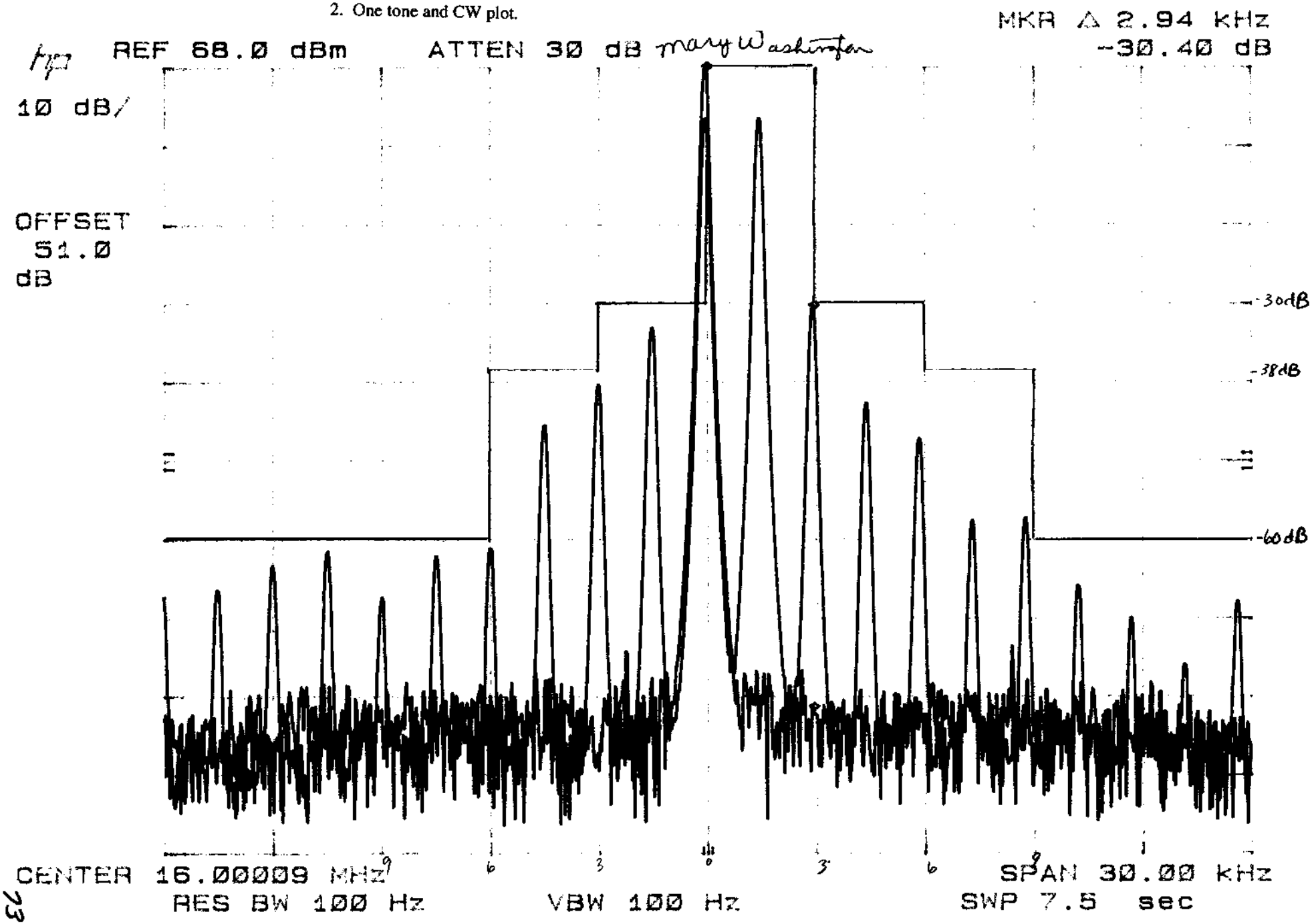
EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone plot.



1/19/99

EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone and CW plot.

DATE: 19 January 1999
TEST: Occupied Bandwidth

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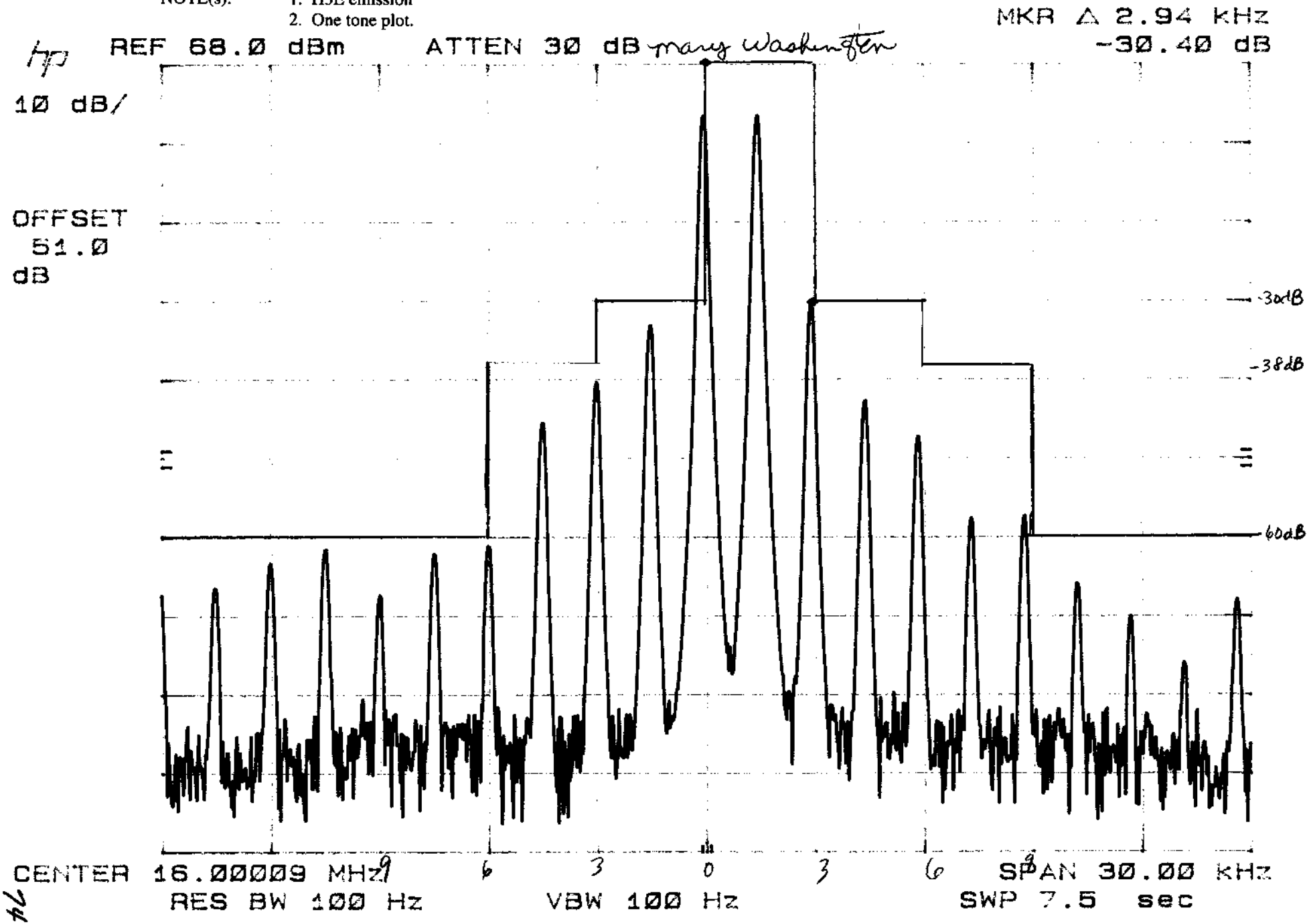
1/19/99

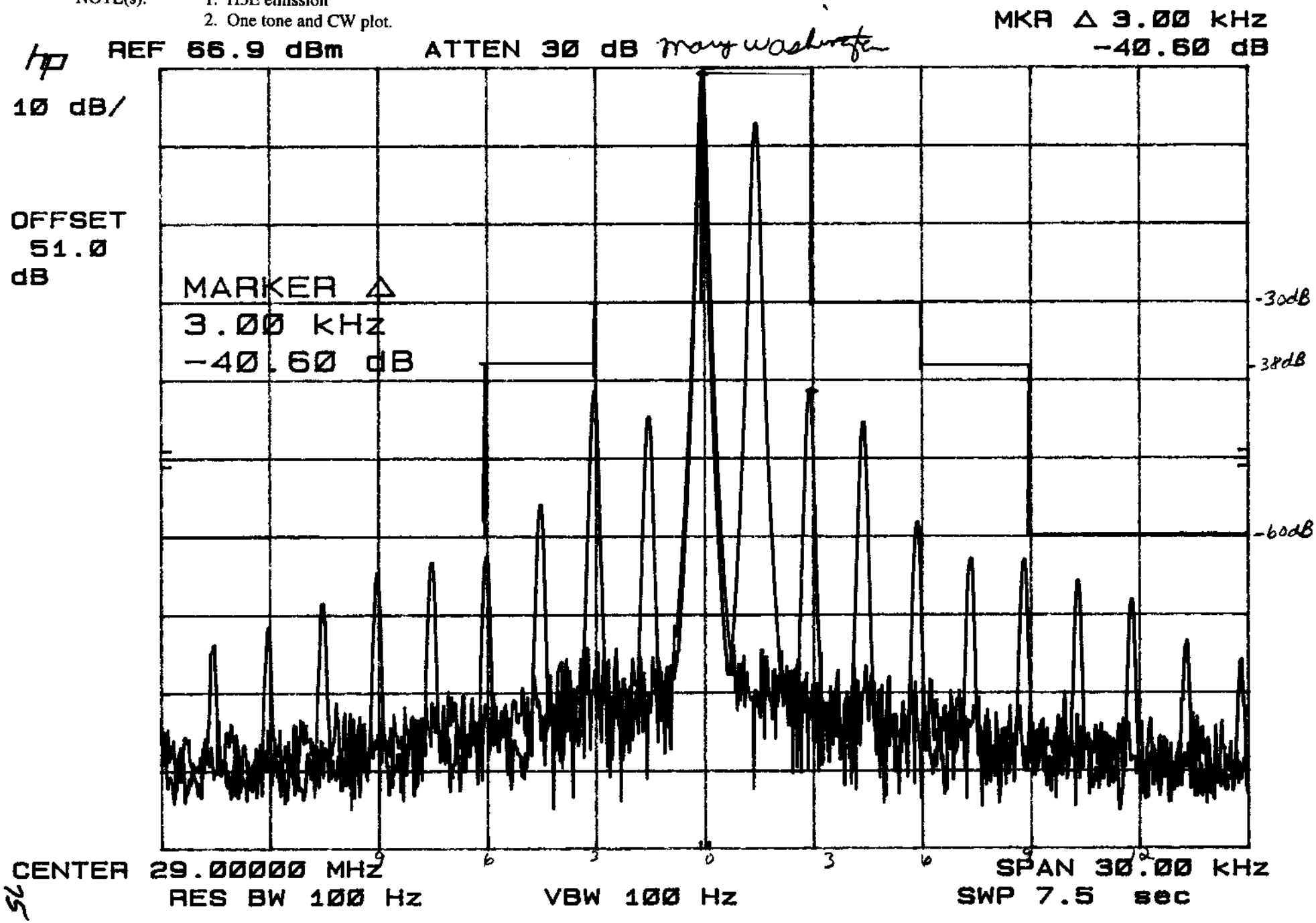
EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone plot.

DATE: 19 January 1999
TEST: Occupied Bandwidth

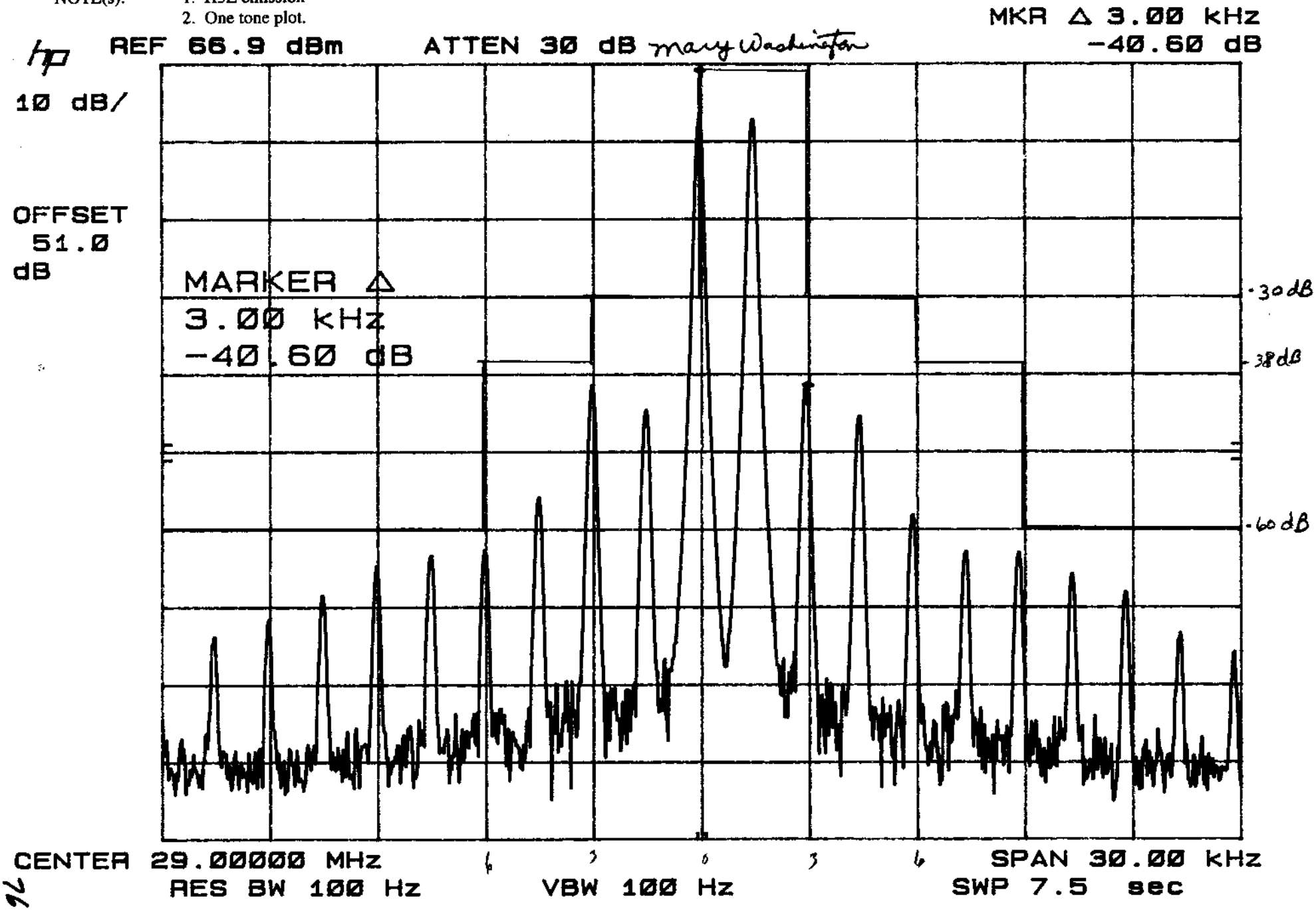


EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone and CW plot.

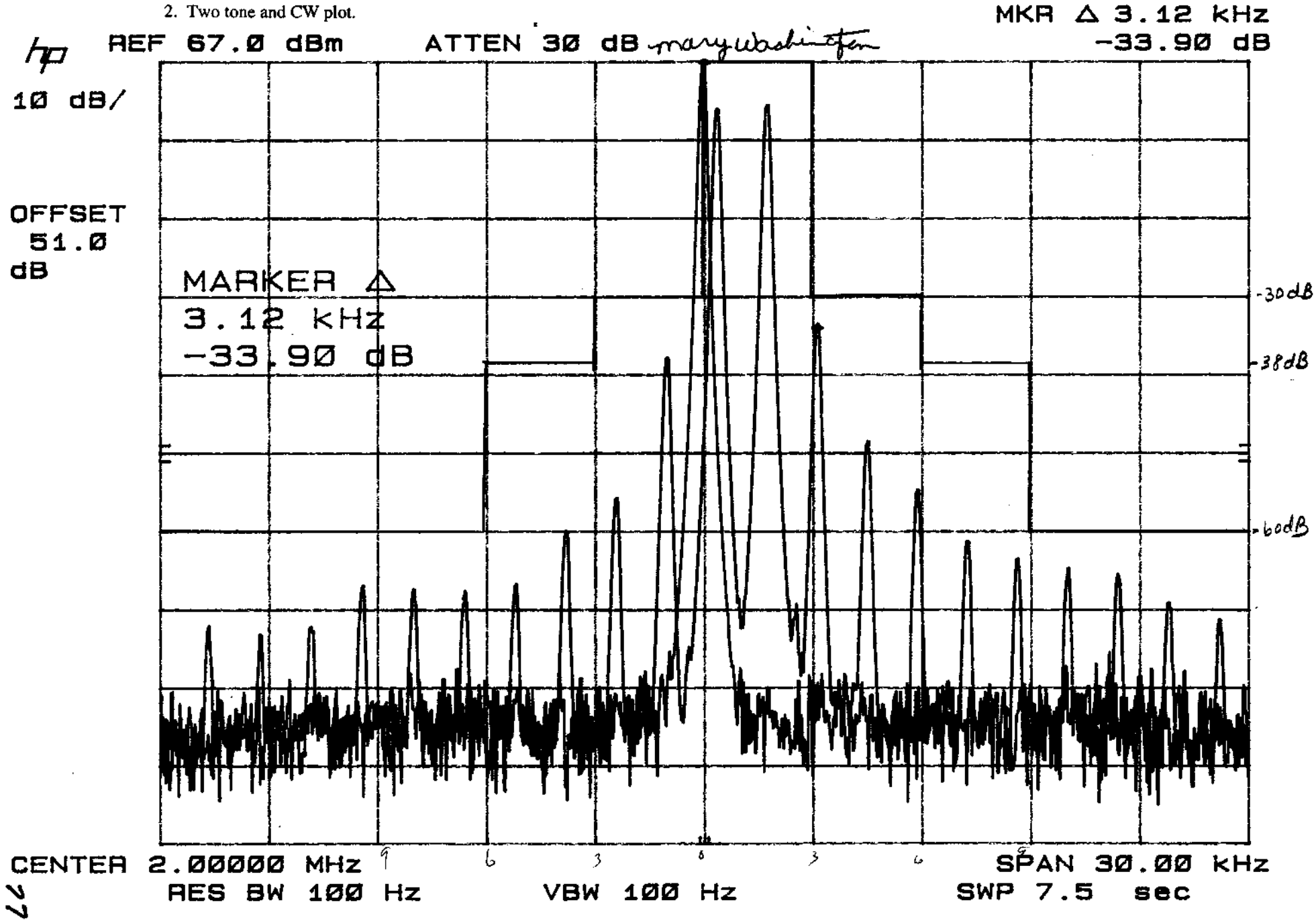
DATE: December 14, 1998
TEST: Occupied Bandwidth



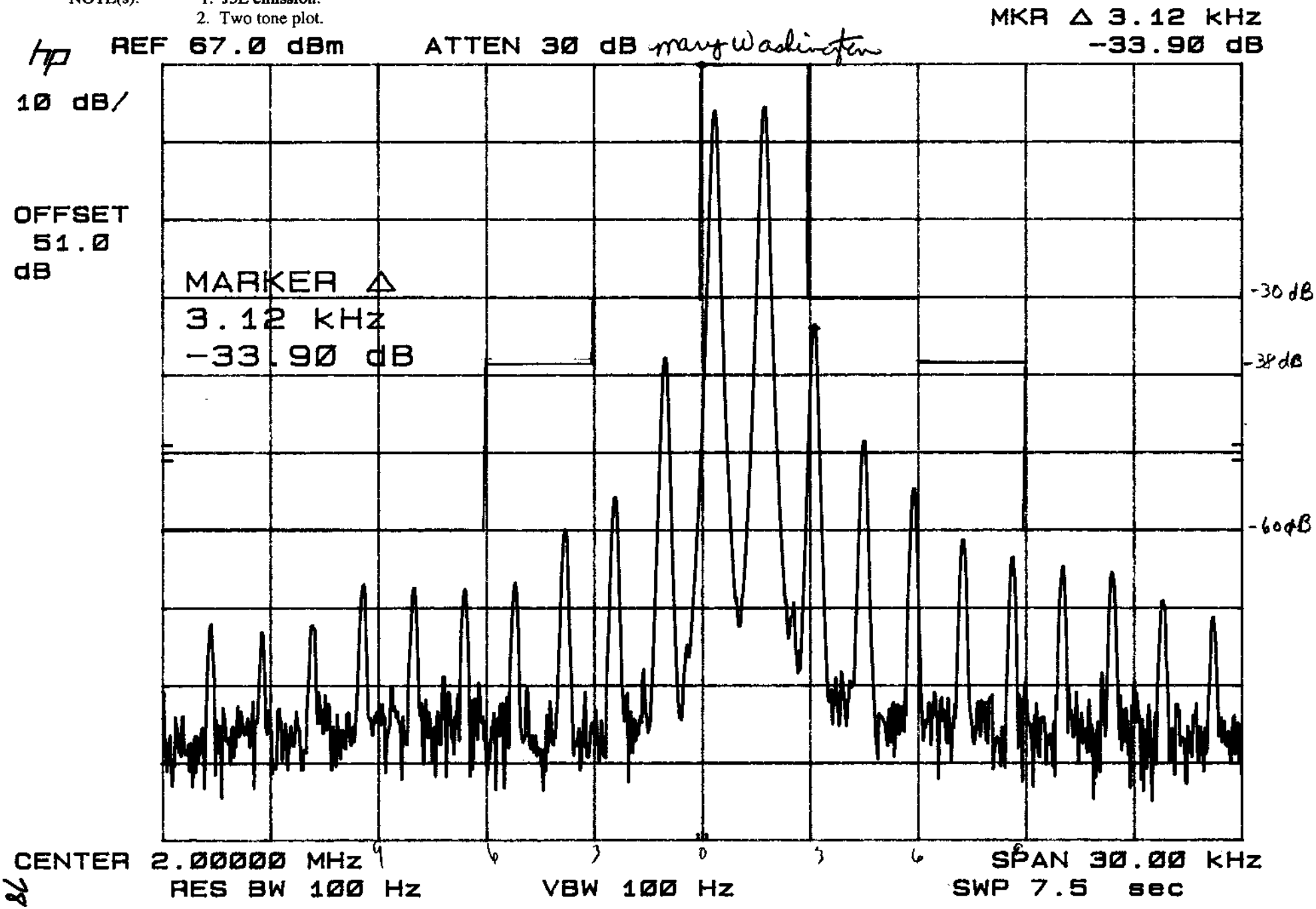
EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. H3E emission
2. One tone plot.



EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone and CW plot.

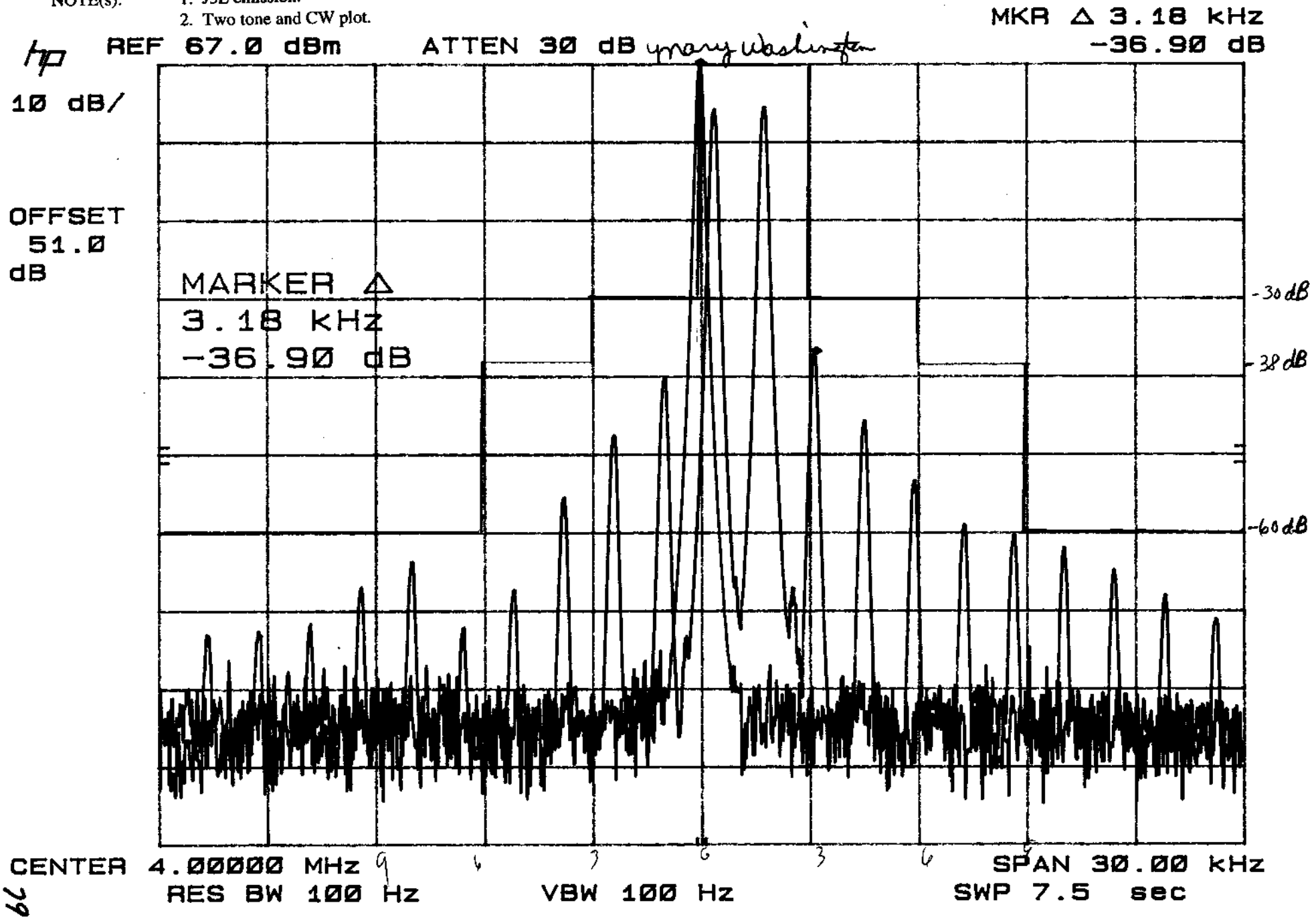


EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone plot.

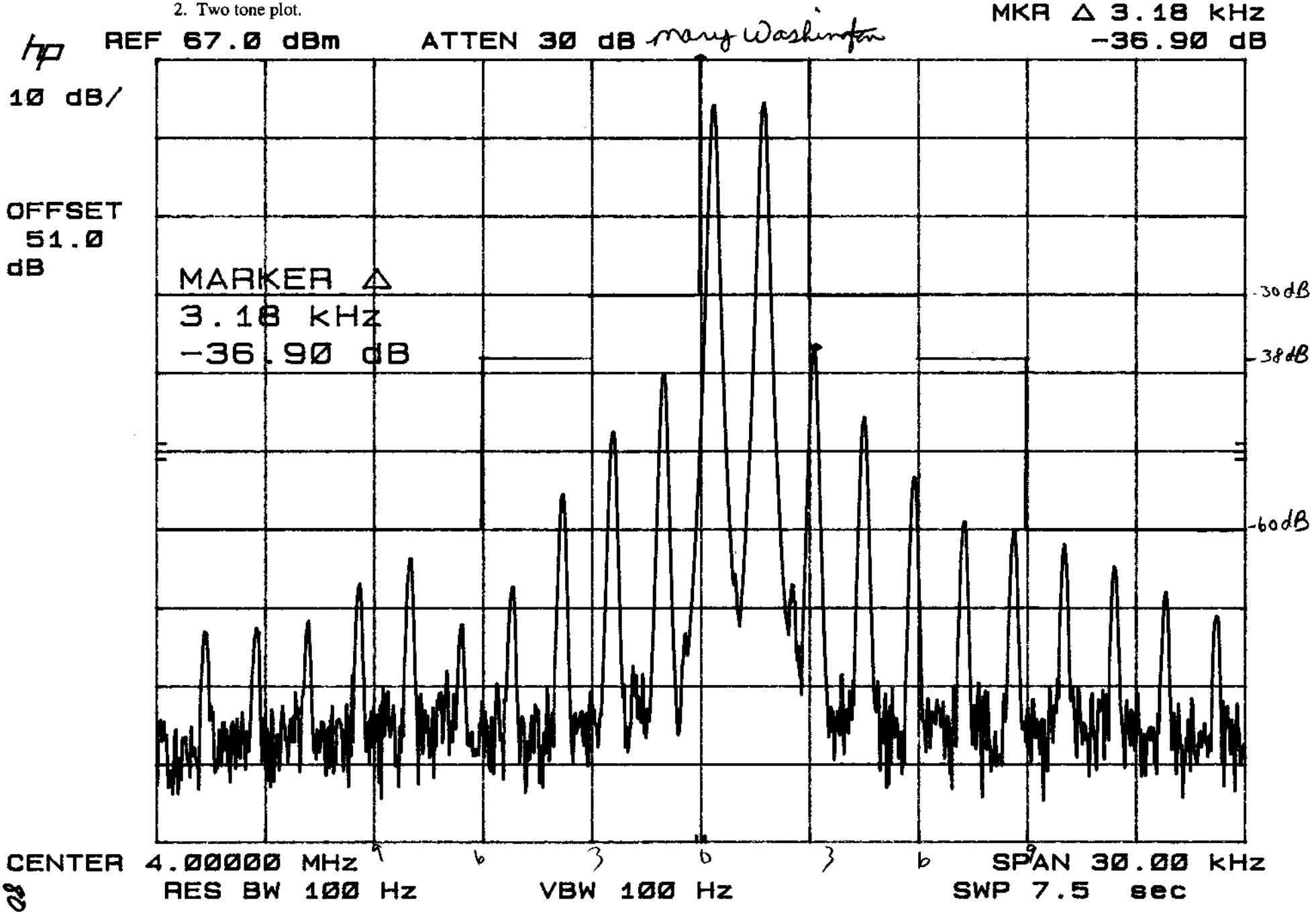


EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)

NOTE(s): 1. J3E emission.
2. Two tone and CW plot.

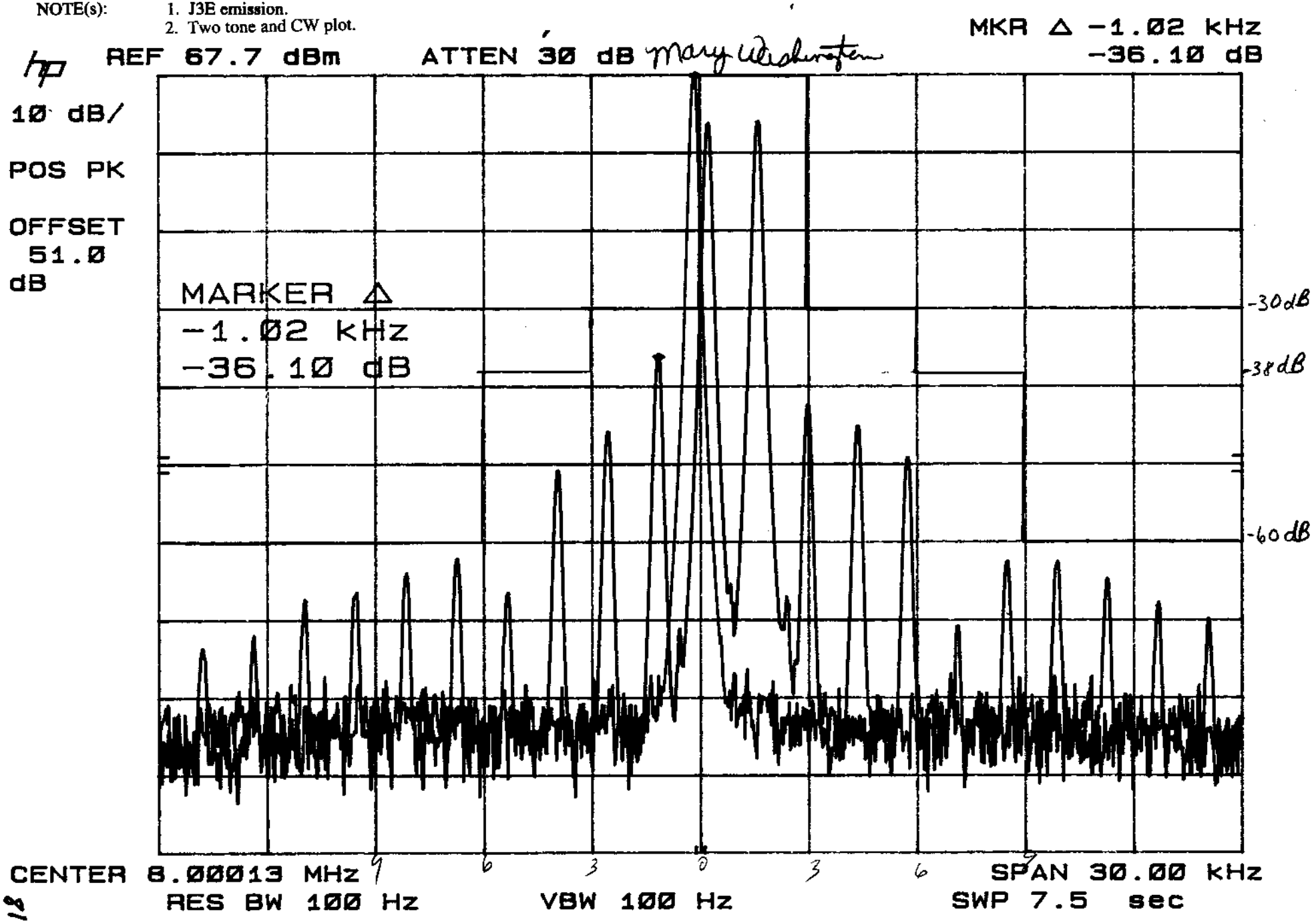


EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone plot.



EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone and CW plot.

DATE: December 14, 1998
TEST: Occupied Bandwidth




Mary Washington

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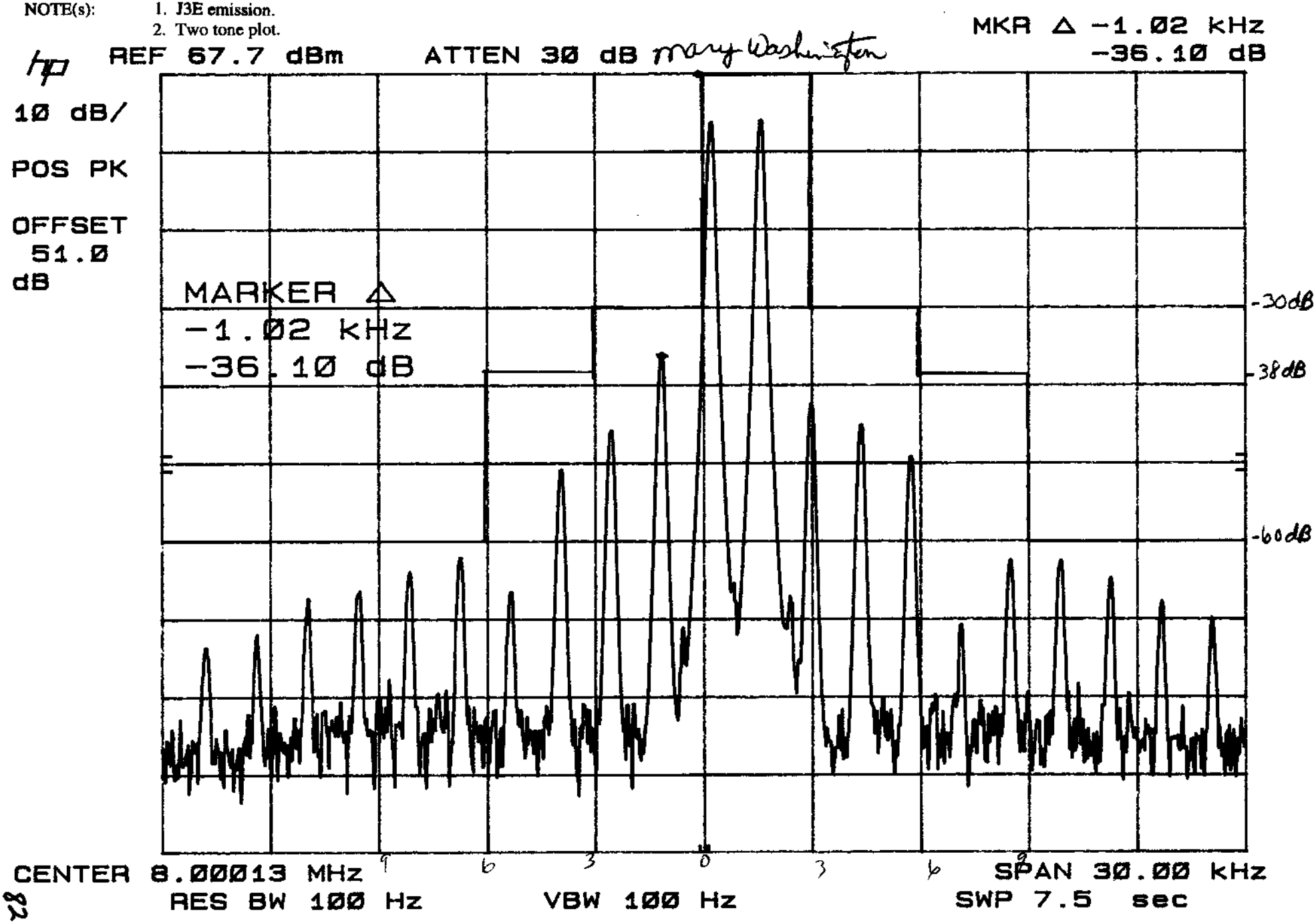
EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone plot.

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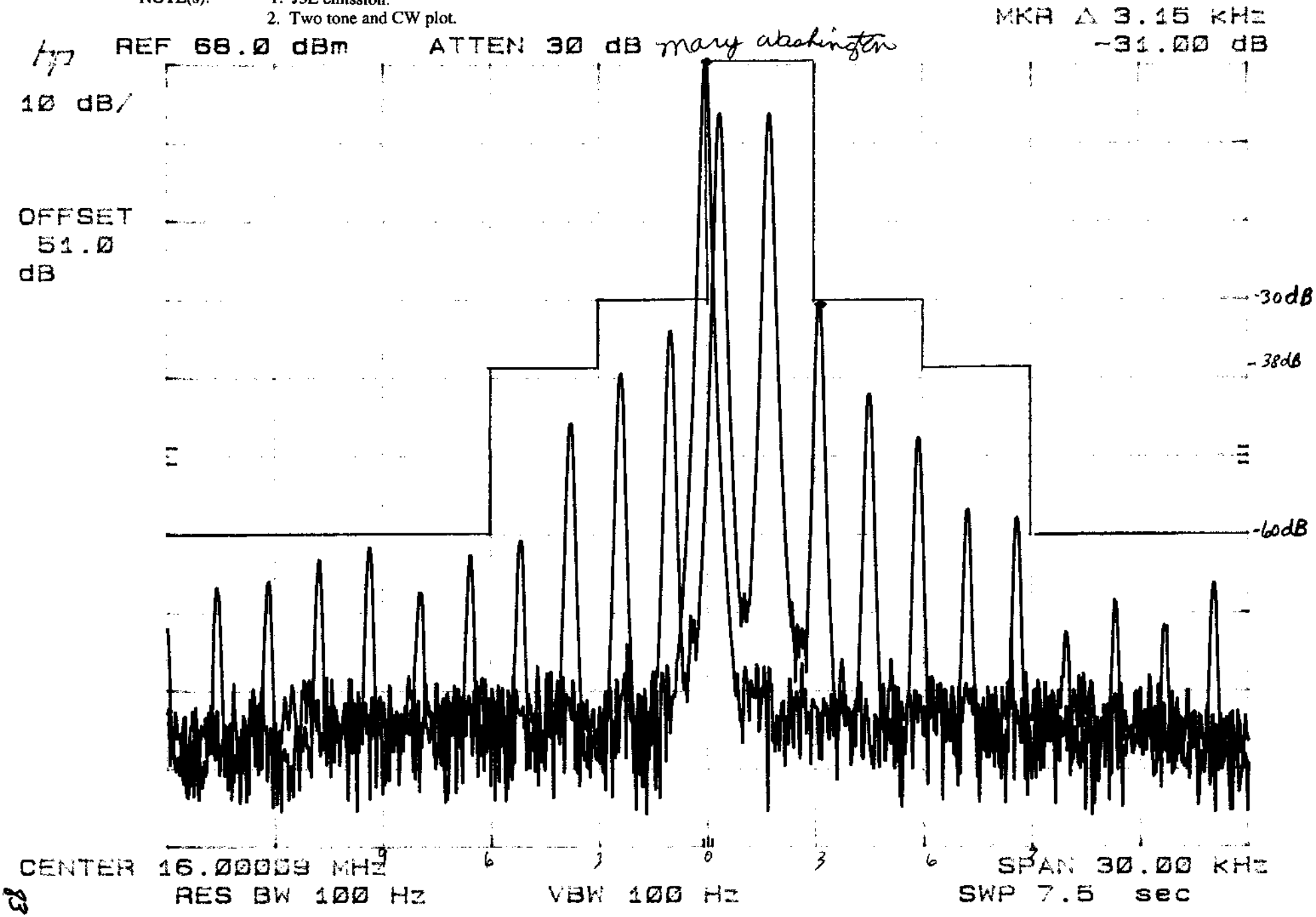
EUT: CTX-5000 5 kW HF Transmitter DATE: 19 January 1999
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone and CW plot.

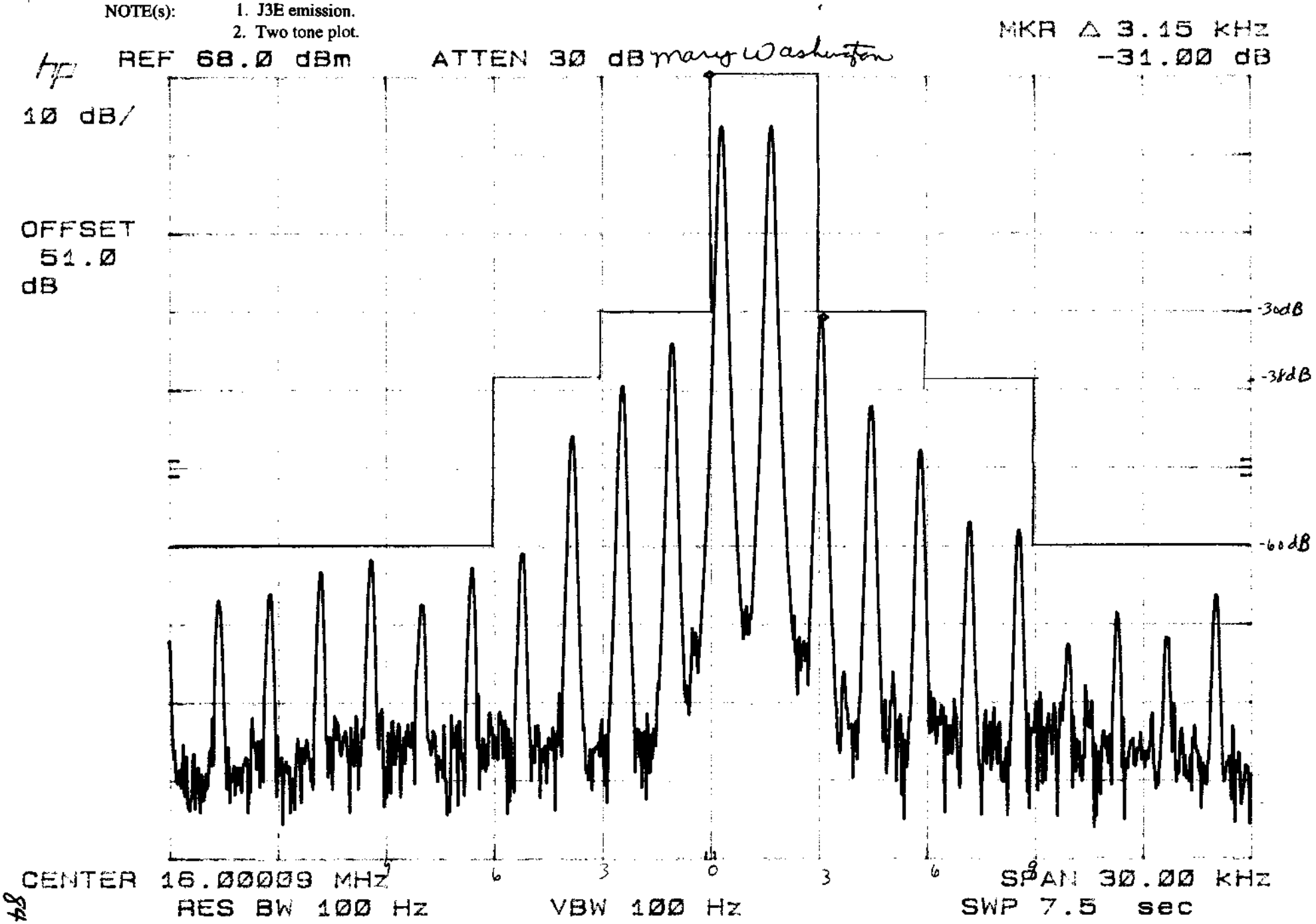
1/19/99



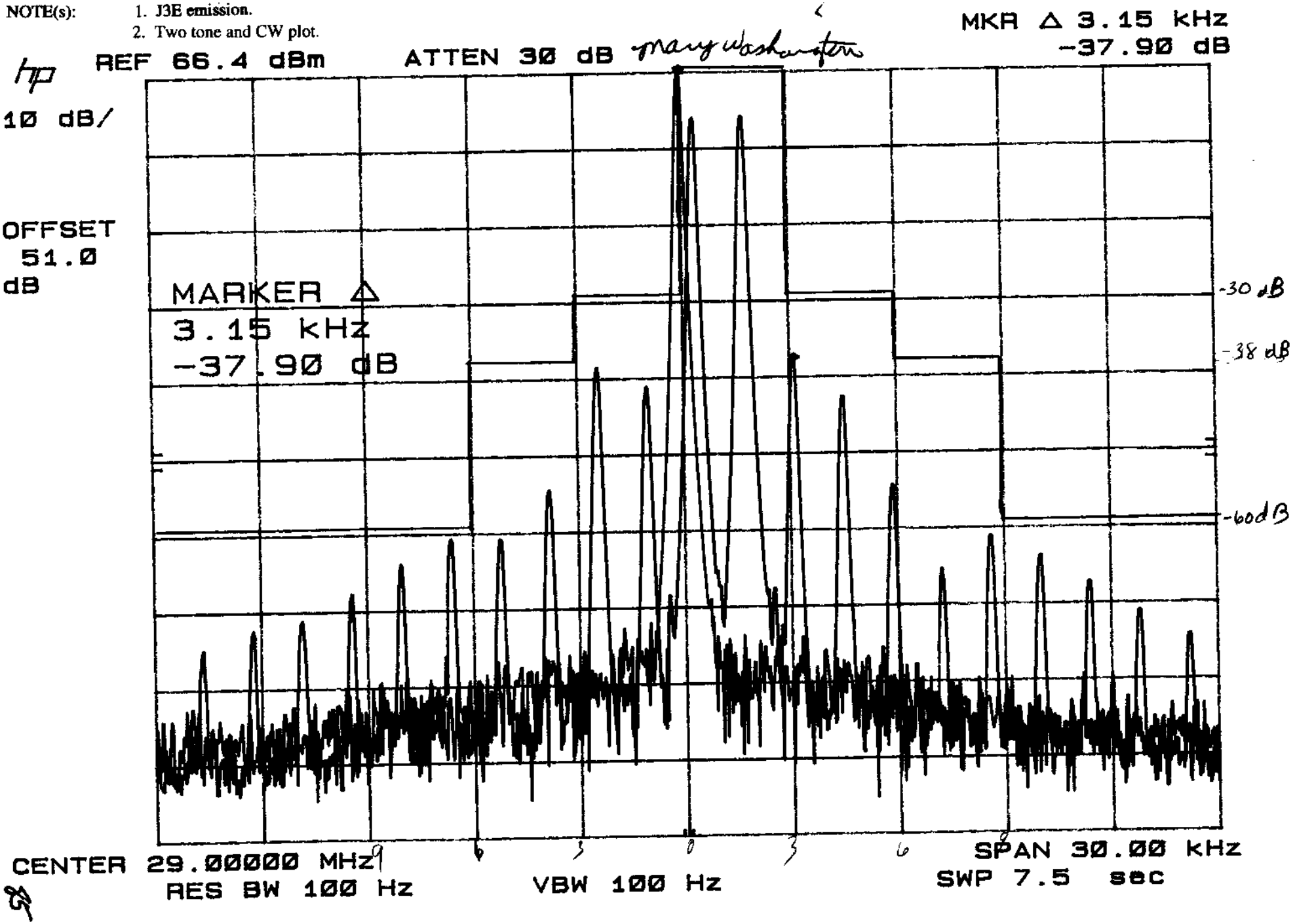
1/19/99

EUT: CTX-5000 5 kW HF Transmitter
CUSTOMER: CUBIC COMMUNICATIONS, INC.
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone plot.

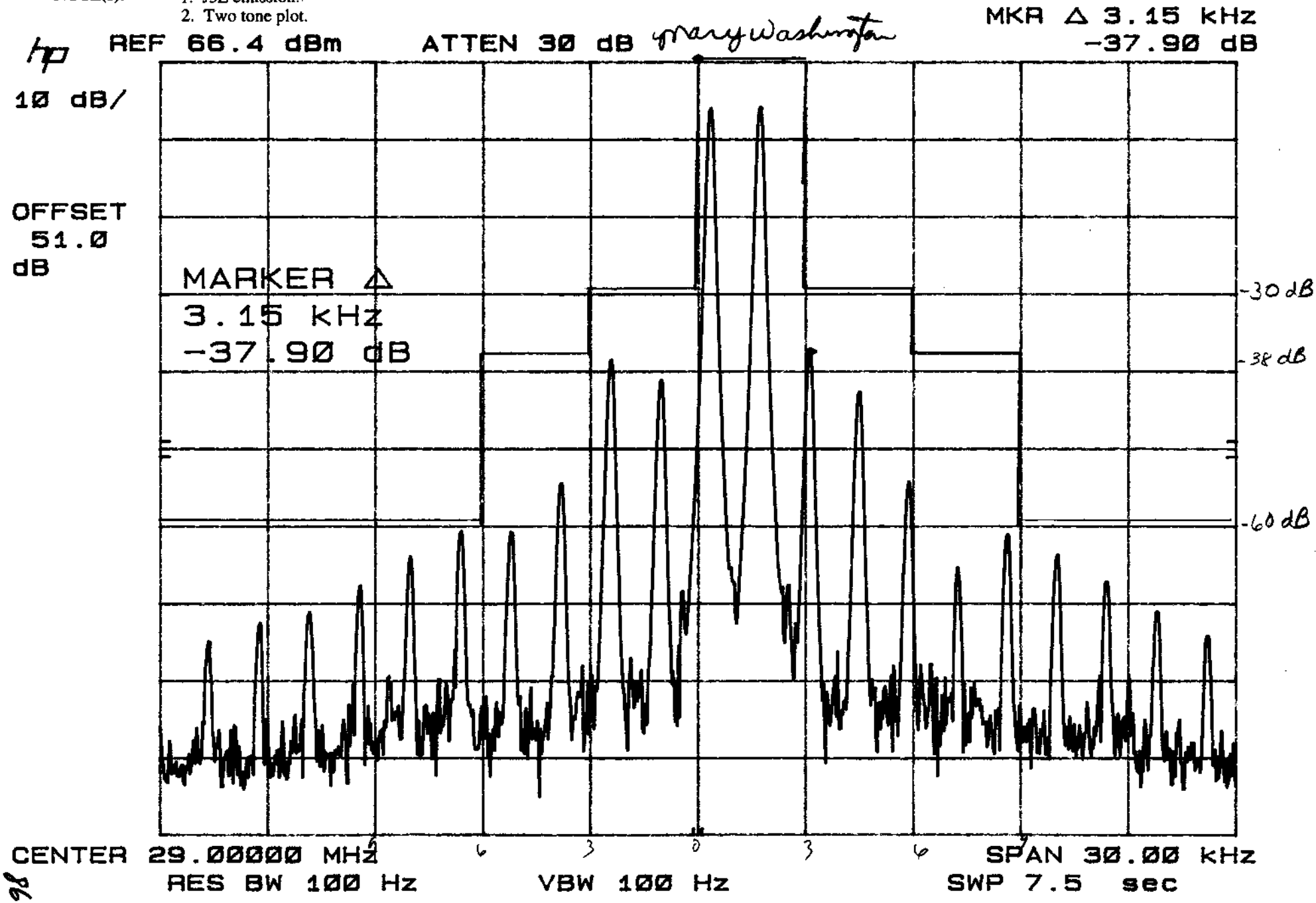
DATE: 19 January 1999
TEST: Occupied Bandwidth



EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone and CW plot.



EUT: CTX-5000 5 kW HF Transmitter DATE: December 14, 1998
CUSTOMER: CUBIC COMMUNICATIONS, INC. TEST: Occupied Bandwidth
SPECIFICATION: FCC part 2, Paragraph 2.989 and Part 87, Paragraph 87.139(c)(1)(2)(3)
NOTE(s): 1. J3E emission.
2. Two tone plot.



## 7 SIGNATURE PAGE

## GENERAL REMARKS:

## SUMMARY:

All tests according to United States Standard 47 CFR Part 15, Subpart B

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements cited on page 1.

☐ - **Does not** fulfill the general approval requirements cited on page 1.

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:

Mary Washington
(EMC Engineer)

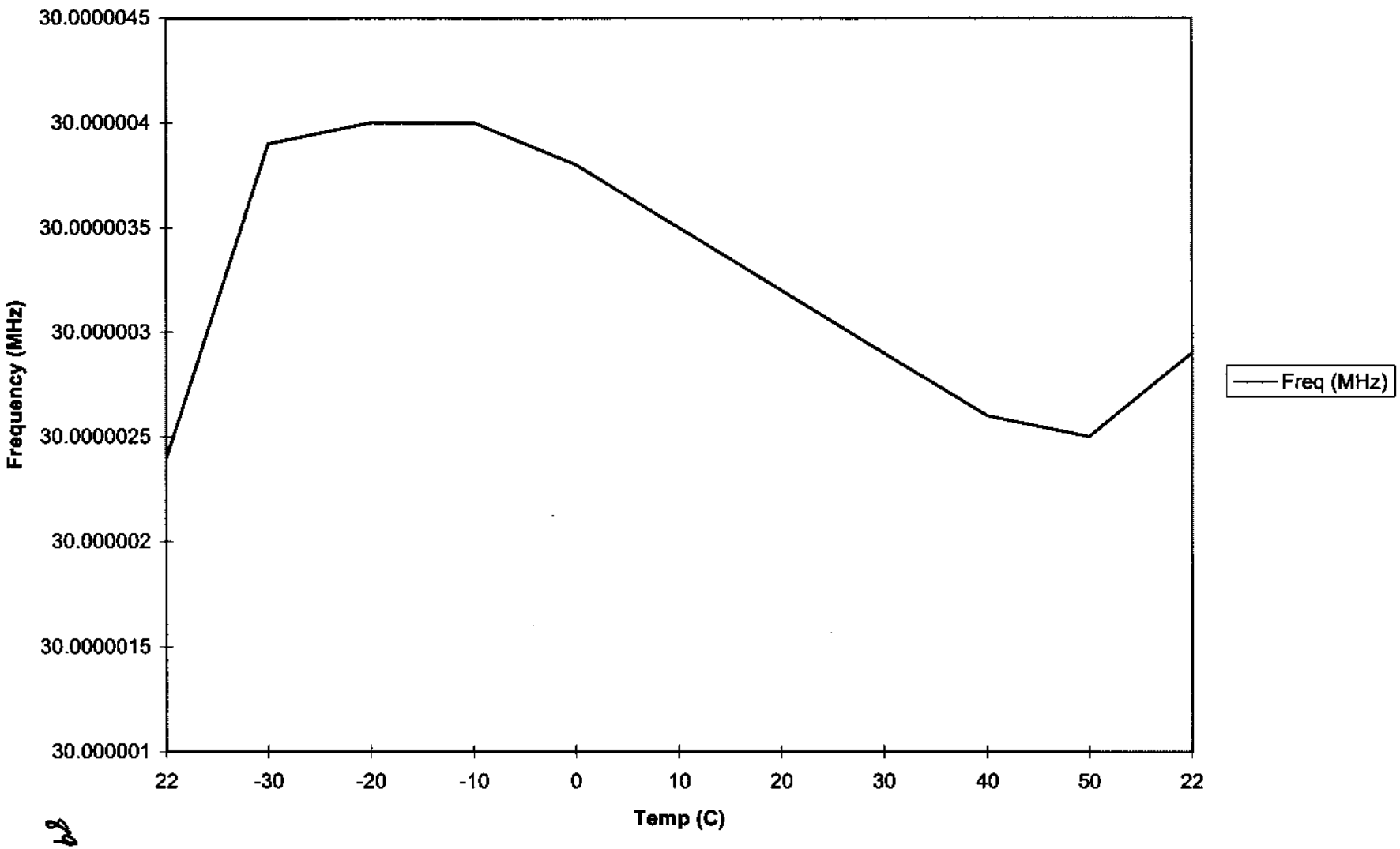
## 8. Data tested by Cubic Communications, Test Setup, and Attestation Statement

Frequency Stability, Part 2, Paragraph 2.995, and Part 87, Paragraph 87.133

Cubic Communications, Inc.
Frequency Stability
January 15, 1999

S8597
FCC Part 2, para. 2.995 and Part 87, Para. 87.133
FCC ID: NVSCTX-5000

## Frequency Stability



**Test Procedure for Temperature Stability Test** Wed 1-13-99

A. Description: The requirements are that the "frequency determining unit" be checked from -30° C to +50° C. The unit must "soak" for one hour before the measurement is taken. This means that the test will be 8 hours.

The only part of the CTX-5000 that must be in the Temperature chamber is the T-4180.

The frequency measurement is taken from the output of the CTX-5000 with a frequency counter (HP5386A) through an appropiate amount of attenuation. The power need not be 5kW - use 100W.

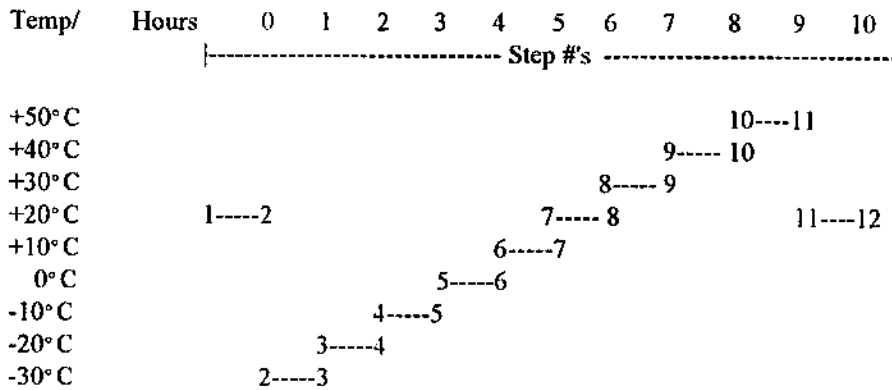
The resolution of the frequency counter will be 0.1 Hz.

Longer Control and RF coax cables must be used between the T-4180 in the chamber and the controller in the CTX-5000.

(Step #)

B. Procedure:

1. Begin: Put the warmed-up T-4180, tuned to 30.0 MHz, into the temperature chamber. Connect it to the CTX-5000. Make a baseline frequency measurment at ambient temperature (+22° C).
2. Time 0: Turn on the temp chamber and set it to -30° C. Wait 1 hour.
3. Time 1: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to -20° C. Wait one hour.
4. Time 2: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to -10° C. Wait one hour.
5. Time 3: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to 0° C. Wait one hour.
6. Time 4: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +10° C. Wait one hour.
7. Time 5: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +20° C. Wait one hour.
8. Time 6: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +30° C. Wait one hour.
9. Time 7: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +40° C. Wait one hour.
10. Time 8: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +50° C. Wait one hour.
11. Time 9: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +22° C. Wait one hour.
12. Time 10: Key the CTX-5000 and make a final baseline freq.measurement.

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TEST DATA SHEET
TEMPERATURE STABILITY TEST
CTX-5000
1-15-99

Verify that the frequency of the CTX-5000 remains ±10 Hz from -30° C to +50° C.

| | Temp (° C) | Frequency (Hz) |
|---|---|---|
| Step 1 | +22 | 30,0000024 |
| Step 2 | | |
| Step 3 | -30 | 30,0000039 |
| Step 4 | -20 | 30,0000040 |
| Step 5 | -10 | 30,0000040 |
| Step 6 | 0 | 30.0000038 |
| Step 7 | +10 | 30.0000035 |
| Step 8 | +20 | 30.0000032 |
| Step 9 | +30 | 30.0000029 |
| Step 10 | +40 | 30.0000026 |
| Step 11 | +50 | 30.0000025 |
| Step 12 | +22 | 30.0000029 |

1/15/99

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# TEMPERTURE STABILITY TEST
# FCC CERTIVICATION
# CTX-5000
# 5 kW TRANSMITTER

A. Purpose: To verify the frequency stability of the CTX-5000 across the full required temperature range.

B. Specification: Less than 10 hz change from -30° C to +50° C in 10° C increments.

C. Equipment:

| | | | |
|---|---|---|---|
| Temperature Chamber | | | |
| 2 kW 30 dB Attenuator | Bird | 8329-300 | 864 NCR |
| 250 W 20 dB Attenuator | Winschal | 45-20-33 | N/A NCR |
| Frequency counter | HP | 5386A | CAL DATE: 10-5-99 |

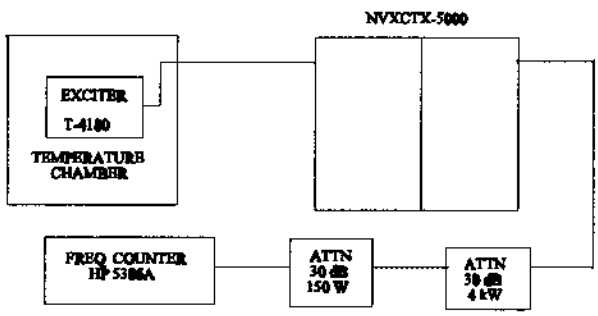
D. Set Up: The T-4180 has the 10 MHz OCXO inside which controls the accuracy of the transmitted frequency. Set the frequency to the highest frequency, 30.0 MHz

Remove the T-4180 from the CTX-5000 and place it inside the temperature chamber. Connect the following cables: Remote control, AC power, CTX Controller and RF Out.

Connect the RF output of the CTX-5000 to a 2 kW, 30 dB attenuator. Connect a 20 dB attenuator and a frequency counter to the output of the 30 dB attenuator.

Transmitt at 100 W to verify that the frequency counter reads the RF output. Set the temperature chamber to the temperatures shown in the following procedure. Let the T-4180 soak for 1 hour at each temperture. Transmitt to verify that the frequency is within specifications. Go to the next frequency.

E. Diagram:

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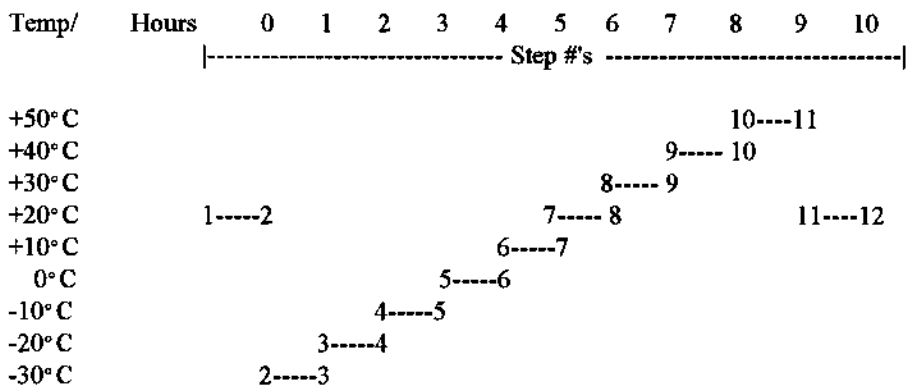
F. Procedure: (Step #)

1. Begin: Put the warmed-up T-4180, tuned to 30.0 MHz, into the temperature chamber. Connect it to the CTX-5000. Make a baseline frequency measurment at ambient temperature (+22° C).
2. Time 0: Turn on the temp chamber and set it to -30° C. Wait 1 hour.
3. Time 1: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to -20° C. Wait one hour.
4. Time 2: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to -10° C. Wait one hour.
5. Time 3: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to 0° C. Wait one hour.
6. Time 4: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +10° C. Wait one hour.
7. Time 5: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +20° C. Wait one hour.
8. Time 6: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +30° C. Wait one hour.
9. Time 7: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +40° C. Wait one hour.
10. Time 8: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +50° C. Wait one hour.
11. Time 9: Key the CTX-5000 and make a frequency measurement. Set the temperature chamber to +22° C. Wait one hour.
12. Time 10: Key the CTX-5000 and make a final baseline frequency measurement.

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To Whom it May Concern:

This is to certify that the test data performed by Cubic Communications, Inc. for FCC ID: NVSCTX-5000 was performed according to the CFR 47 paragraphs reference on the data records.

Michael E. Norman Michael E. Norman

Signed Printed

2-19-99

Date