MEASUREMENT AND TECHNICAL REPORT

POWERWAVE TECHNOLOGIES
2026 McGaw Avenue
Irvine, CA 92614

DATE: 12 March 1999

This Report Concerns:	Original Grant: X	Class II Change:

Equipment Type:	Multicarrier Cellular Amplifier and Subrack, Model MCA9129-90 & MCR4109-1

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, 2.991, and 2993, Part 22, Paragraph 22.917

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

CUSTOMER INFORMATION	
COMPANY NAME:	POWERWAVE TECHNOLOGIES
COMPANY ADDRESS:	2026 McGaw Avenue
	Irvine, CA 92614
PHONE NUMBER:	949 757 0530
FAX NUMBER/E-MAIL ADDRESS:	949 757 6674 / jdale@pwav.com
CUSTOMER CONTACT:	Jeffrey A. Dale
PRODUCT DESCRIPTION	
NAME, MODEL, SERIAL # OF EUT:	Multicarrier Cellular Amplifier and Subrack, Model MCA9129-90, MCR4109-1

Electromagnetic Compatibility (EMC) Test Plan

1.0 EUT Documentation

This section provides the necessary documentation for detailing the Equipment Under Test (EUT). Descriptions of the equipment including software and documentation on installation and operations should be provided.

Additional documentation necessary for test plan completion should be attached to the back of the test plan. For additional instruction on how to complete your test plan contact your TÜV Product Service representative.

1.1 EUT Description: The MCA9129-90 is a linear, feed-forward power amplifier that operates in the 25 MHz frequency band from 869 MHz to 894 MHz. The amplifier can simultaneously transmit multiple frequencies, with better than -65 dBc third order intermodulation distortion (IMD). It is designed for use in an amplifier system that is modular in design, and is ideally suited for use in AMPS/TDMA/CDMA base stations. When used in a subrack employing four MCA9129-90 amplifiers, the system offers up to 360 watts output. The plug-in Model MCA9129-90 amplifier modules can each provide 100 watts of power and function completely independently of each other. The amplifier modules are designed for parallel operation to produce high peak power output and backup redundancy for remote applications. All solid-state, the system is designed to provide trouble-free operation with minimum maintenance. The system's modular construction and unique and highly effective LED-based operational status and fault indicators help minimize downtime. The turn-on and turn-off sequences of voltages are fully automatic, as is overload protection and recycling. Inadvertent operator damage from front panel manipulation is virtually impossible.

Each amplifier module has a status connector that allows the host system to monitor the amplifier module performance. The front panel of each amplifier module has unit level status/fault indicators and an RF on/off/reset switch. Primary power for the amplifier is +27 Vdc. Cooling for each plug-in amplifier module is provided by three fans, two mounted on the front and one on the rear of the module. The fans draw outside air through the front of the module and exhaust hot air out through the rear of the module.

The MCR4109-1 24-inch center-mount subrack contains an RF power splitter/combiner and a summary logic module that monitors the functional status of all plug-in amplifiers. The rear panel of the subrack interfaces with the host system via the system RF I/O connectors, an RF output sample connector, and a form C remote status connector to monitor the system. The system offers up to 360 watts output when four 100-watt amplifiers are employed. Primary power for the amplifier system is +27 Vdc, approximately 150 amps.

1.1.1 Components of EUT

(List each one separately. Add attachment if necessary. NOT TO INCLUDE PERIPHERALS.)

Description	Model Number	Serial Number	FCC ID Number
Multicarrier Cellular Amplifier	MCA9129-90		E675JS0035
Multicarrier Cellular Amplifier System Subrack	MCR4109-1		E675JS0035

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Electromagnetic Compatibility (EMC) Test Plan

1.2 Operating modes: (list and describe)

The MCA9129-80 amplifier operates in the 869-894MHz frequency range at an average output power of 100W per module stand-alone, or 80W per module when installed in the MCR4109-1 subrack, for a total possible output of 360W (if four amplifier modules are installed). It is capable of amplifying multiple carriers of CDMA, TDMA, or AMPS modulated input signals. The amplifier does not provide any modulation of its own.

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Electromagnetic Compatibility (EMC) Test Plan

1.3 EUT I/O Ports and Cables:

1.3.1 I/O Cables (Add attachment if necessary.)

CONNECTION:	RF Input
SHIELD:	Yes
CONNECTORS:	SMA
TERMINATION TYPE:	50 Ohm
LENGTH:	Not specified
REMOVABLE:	Yes

CONNECTION:	RF Output
SHIELD:	Yes
CONNECTORS:	Type N
TERMINATION TYPE:	50 Ohm
LENGTH:	Not specified
REMOVABLE:	Yes

CONNECTION:	DC Input (+27V, Gnd.)
SHIELD:	No
CONNECTORS:	Ring terminal
TERMINATION TYPE:	Bolt on
LENGTH:	Not specified
REMOVABLE:	Yes

CONNECTION:	
SHIELD:	
CONNECTORS:	
TERMINATION TYPE:	
LENGTH:	
REMOVABLE:	

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Electromagnetic Compatibility (EMC) Test Plan

1.3.2 Power Cords (Add attachment if necessary.)

UNIT:	Not applicable
MANUFACTURER:	
SHIELDED:	
LENGTH:	

UNIT:	
MANUFACTURER:	
SHIELDED:	
LENGTH:	

UNIT:	
MANUFACTURER:	
SHIELDED:	
LENGTH:	

1.3.3 Power requirements:

***Note: European power is typically 230 VAC 50Hz or 400 VAC 50Hz, single and three phase, respectively. FCC requires testing to be performed at typical US power ratings at 60Hz.**

230 VAC 50Hz -- single phase Amps

400 VAC 50Hz -- three phase Amps per phase

120 VAC 60Hz -- single phase Amps

+27 VDC 45-180 Amps

Battery: VDC Expected life: Hours

Other: (describe)

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Electromagnetic Compatibility (EMC) Test Plan

1.4 Oscillator Frequencies

Frequency	EUT Location	Description of use
3.5795 MHz	Loop Ctrl. PCB	Freq. Ref.
8 MHz	Loop Ctrl. and Alarm PCB	Freq. Ref.
10.245 MHz	Loop Ctrl. PCB	Freq. Ref.

1.5 Power Supply

Description	Manufacturer	Model #	Serial #	Switching frequency or linear
DC power supply	Power Ten	P63C-30330	1011018	Switching

1.6 Power Line Filters

Manufacturer	Model #	Qty	LOCATION ON EUT
Not applicable			

1.7 Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or value	Qty	LOCATION ON EUT
Not applicable				

1.8 Description of Enclosure: (including Gasketing, Coatings, Bonding, etc.)

Aluminum alloy machined housing with chem-film and paint coatings.

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Electromagnetic Compatibility (EMC) Test Plan

1.9 Interfacing and/or Simulators Peripheral Equipment

(Please provide a complete description of all peripherals to be used during testing, please note that all I/O ports must be appropriately loaded)

DESCRIPTION:	Digital Signal Generator
MANUFACTURER:	Hewlett Packard
MODEL NUMBER:	E4433B
SERIAL NUMBER:	US38330318
FCC ID:	N/A

DESCRIPTION:	RF Power Meter
MANUFACTURER:	HP
MODEL NUMBER:	437B
SERIAL NUMBER:	3125U24892
FCC ID:	N/A

DESCRIPTION:	RF Power Sensor
MANUFACTURER:	HP
MODEL NUMBER:	8481A
SERIAL NUMBER:	3318A97928
FCC ID:	N/A

DESCRIPTION:	Dual Directional Coupler
MANUFACTURER:	HP
MODEL NUMBER:	778D
SERIAL NUMBER:	17328
FCC ID:	N/A

DESCRIPTION:	50 Ohm Load
MANUFACTURER:	Weinschel
MODEL NUMBER:	53-20-34
SERIAL NUMBER:	LD907
FCC ID:	N/A

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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 2.989, 2.991 and Part 22, Paragraph 22,816
- 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 22, Paragraph 22.917
- 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 22, Paragraph 22.917

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

Frequency range: 869 - 894 MHz

Rated RF output power: 100W per amplifier; 360W maximum (4 amplifiers in subrack)

Frequency tolerance: N/A

Emission Designators: F1D, F2D, F3D, F8W, F9W

Microprocessor model Number: N/A

Quantity production: Greater than 100 units

Types of emission: CDMA, TDMA, AMPS

Frequency range: 869 - 894 MHz

Range of operating power: 0 - 100 W

Maximum power rating: 100 W

Voltages and Currents applied: See Block Diagrams, section 4.1 and schematics.

Functions of active circuit devices: See Block Diagrams, section 4.1 and schematics.

Tune-up Procedure: User Manual Model MCR4109-1 section 3-3; User manual Model MCA9129-90, section 3-4.

Description of all circuitry and devices provided for determining and stabilizing frequency: Not applicable, EUT is a power amplifier.

Means for limiting spurious radiation: N/A; Means for limiting modulation: N/A; EUT is a power amplifier; Means for limiting power: the alarm logic controls the DC bias voltage which shuts down the amplifier on an input overpower condition.

Digital modulation tecnniques: N/A

2 PRODUCT LABELING

Figure 2.1 FCC ID Label

See following page.

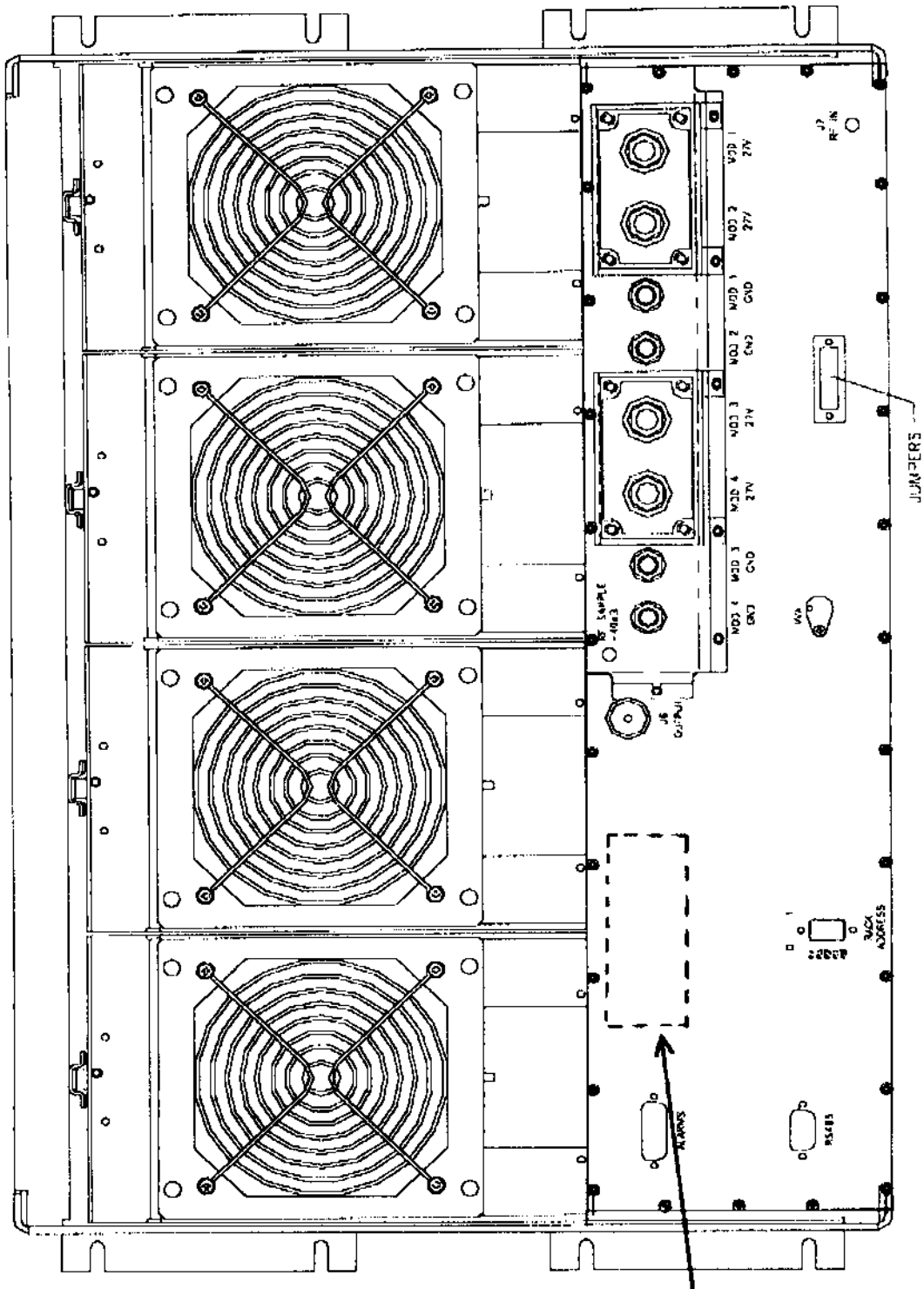

Figure 2-1. MCR4109-1 Rear View

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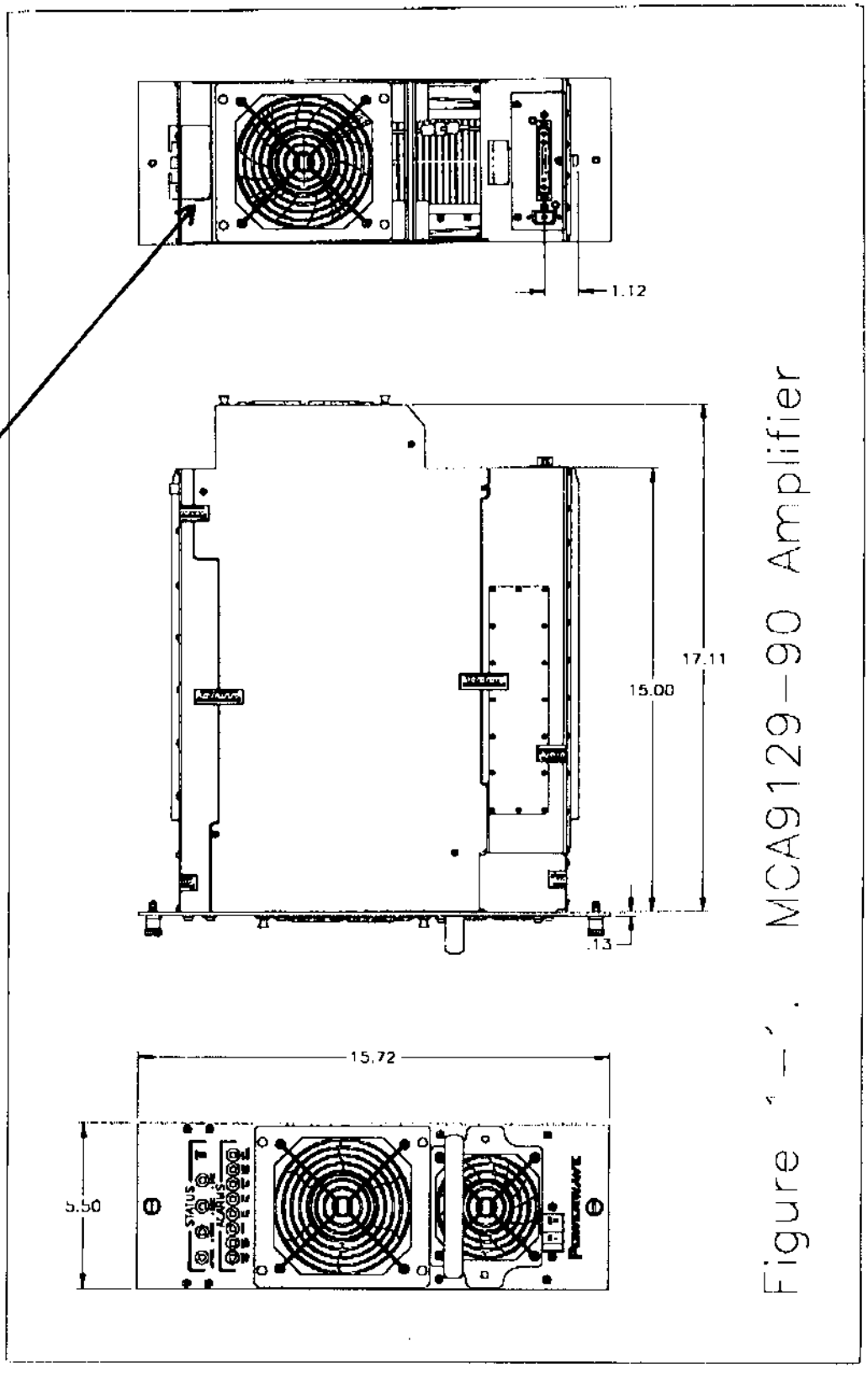

Figure 1-1. MCA9129-90 Amplifier

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PROPOSED FCC ID LABELS:

POWERWAVE
TECHNOLOGIES

FCC: E675JS0035

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE CONDITION THAT THIS DEVICE DOES NOT CAUSE HARMFUL INTERFERENCE.

MODEL MCA9129-90

POWERWAVE
TECHNOLOGIES

FCC: E675JS0035

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE CONDITION THAT THIS DEVICE DOES NOT CAUSE HARMFUL INTERFERENCE.

MODEL MCR4109-1

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The Multicarrier Cellular Amplifier and Subrack, Model MCA9129-90, MCR4109-1 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 Multicarrier Cellular Amplifier and Subrack, Model MCA9129-90, MCR4109-1

4.1 Block Diagram Description

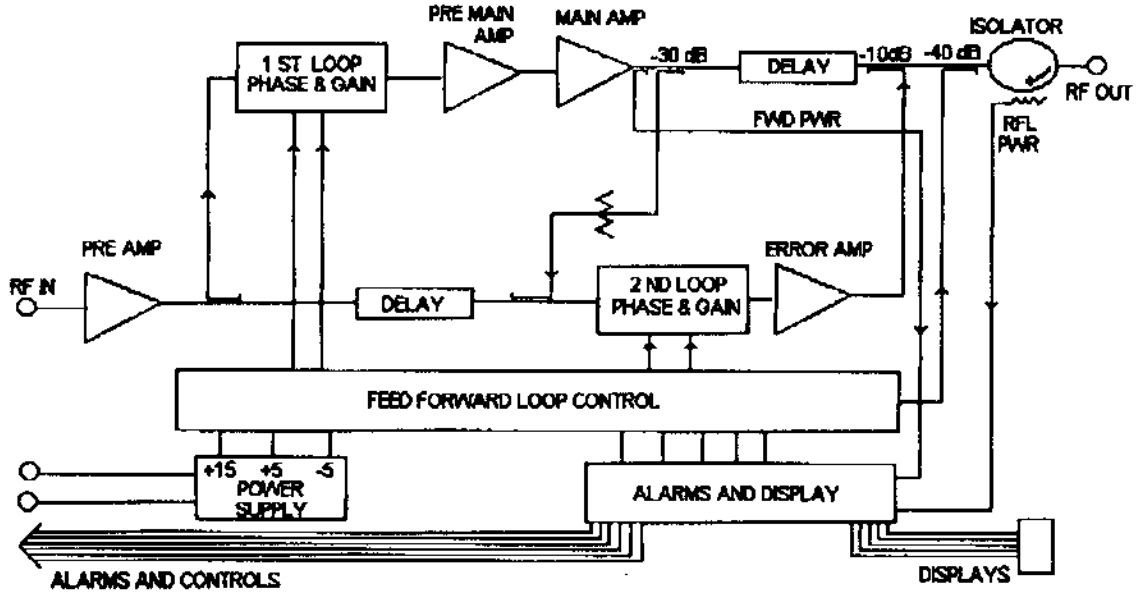
Multicarrier Cellular Amplifier and Subrack, Model MCA9129-90, MCR4109-1 (See page 5 of this document.)

See following page for block diagram.

Electromagnetic Compatibility (EMC) Test Plan

1.10 System Configuration Block Diagram

Use Word Draw or another draw program to draw the block diagram.



MCA9129-90 Power Amplifier Module Functional Block Diagram

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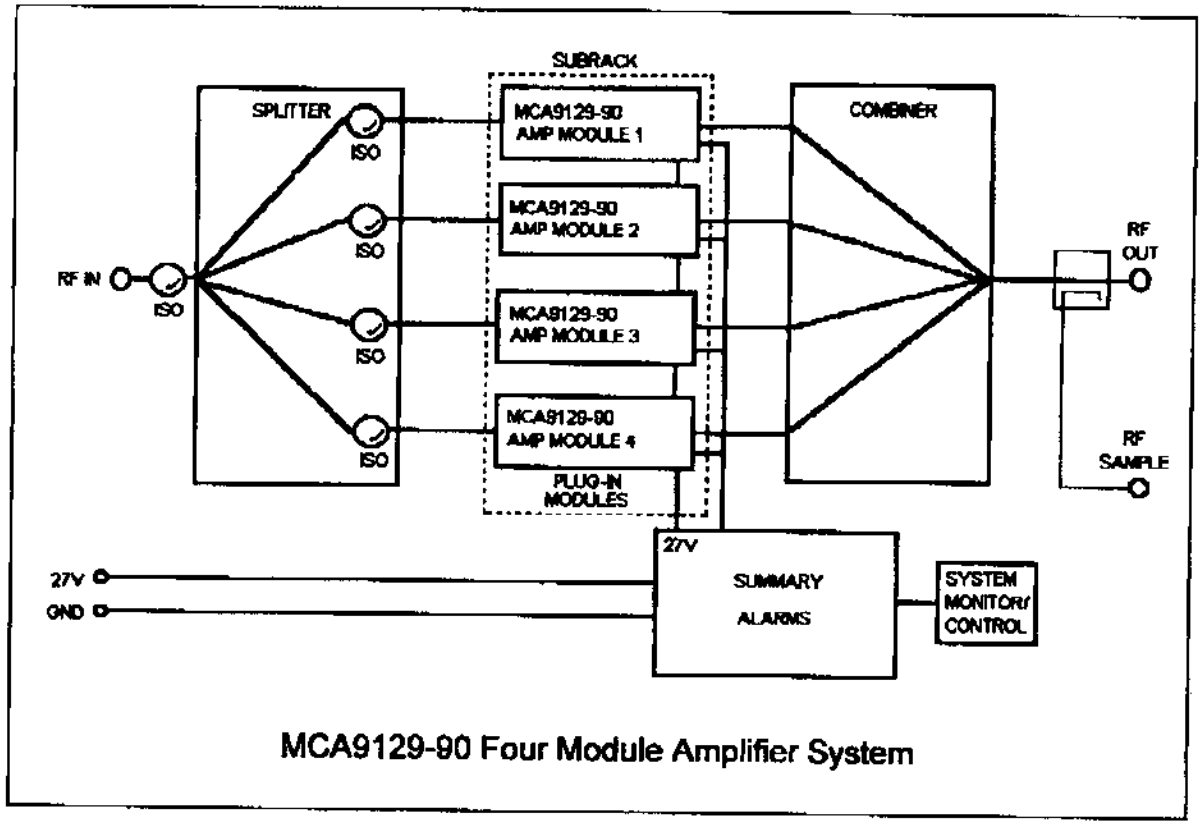
Electromagnetic Compatibility (EMC) Test Plan



MCA9129-90 Four Module Amplifier System

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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).

See test setup photos for radiated emissions test setup.

REPORT No: S9046 TESTED BY: MW SPEC: FCC Part 2, Para. 2.993
MW FCC Part 22, Para. 22.917

CUSTOMER: Powerwave Technologies, Inc. TEST DIST: 3 Meters

E U T: MCA 9129-90 & MCR 4109-1 TEST SITE: 3

EUT MODE: CW, Max Power BICONICAL: N/A

DATE: 01-Feb-99 LOG: 244

NOTES: 100 watt configuration. OTHER: 453

RBW and VBW = 100 kHz below 1 GHz.

RBW and VBW = 1 MHz above 1 GHz.

No emissions were detectable after sixth harmonic.

v.beta1

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
869	61		611.7		26.9	**638.6**						210	1
1738	45.1		43.1		31.8	**76.9**		84.4		-7.5		272	1
2607	22.8		22.2		35.4	**58.2**		84.4		-26.2			
3476	13.2		8.9		39.4	**52.6**		84.4		-31.8			
4345	4.9		5.6		40.2	**45.8**		84.4		-38.6			
5214	6.5		3.6		42.3	**48.8**		84.4		-35.6			
881	58.5		57.5		27.1	**85.6**						160	1
1762	40.1		38.3		31.9	**72.0**		84.4		-12.4		37	1
2643	23		20.1		35.6	**58.6**		84.4		-25.8			
3524	11.1		12.6		39.6	**52.2**		84.4		-32.2			
4405	4.9		4.7		40.0	**44.9**		84.4		-39.5			
5286	2.9		3.3		42.4	**45.7**		84.4		-38.7			
894	55.4		57.6		27.0	**84.6**						36	1
1788	38.5		39.4		32.1	**71.5**		84.4		-12.9		0	1.1
2682	29.1		26.4		35.9	**65.0**		84.4		-19.4			
3576	14.5		11.9		39.8	**54.3**		84.4		-30.1			
4470	7.7		8.3		39.8	**48.1**		84.4		-36.3			
5364	1.3		1.8		42.6	**44.4**		84.4		-40			

REPORT No: S9046 TESTED BY: MW SPEC: FCC Part 2, Para. 2.993
MW FCC Part 22, Para. 22.917

CUSTOMER: Powerwave Technologies, Inc. TEST DIST: 3 Meters

E U T: MCA 9129-90 & MCR 4109-1 TEST SITE: 3

EUT MODE: CW, Max Power BICONICAL: N/A

DATE: 01-Feb-99 LOG: 244

NOTES: 90 watt configuration. OTHER: 453

RBW and VBW = 100 kHz below 1 GHz.

RBW and VBW = 1 MHz above 1 GHz.

No emissions were detectable after sixth harmonic.

v.beta1

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
869	68.5		68.2		26.9	**95.4**						262	1.5
1738	50.8		52		31.8	**83.8**		84.4		-0.6		295	1
2607	24		25.3		35.4	**60.7**		84.4		-23.7			
3476	10.7		11.8		39.4	**51.2**		84.4		-33.2			
4345	5.3		4.5		40.2	**45.5**		84.4		-38.9			
5214	4.1		3.6		42.3	**46.4**		84.4		-38			
881	69.5		69.4		27.1	**96.6**						179	1.1
1762	51.2		49.5		31.9	**83.1**		84.4		-1.3		262	1
2643	22.3		22.4		35.6	**58.0**		84.4		-26.4			
3524	10.6		8.4		39.6	**50.2**		84.4		-34.2			
4405	9.6		7.6		40.0	**49.6**		84.4		-34.8			
5286	5.4		4.3		42.4	**47.8**		84.4		-36.6			
894	67.5		67		27.0	**94.5**						230	1.3
1788	49.7		48		32.1	**81.8**		84.4		-2.6		263	1
2682	23.1		25.8		35.9	**61.7**		84.4		-22.7			
3576	10.4		12.5		39.8	**52.3**		84.4		-32.1			
4470	10.2		9.7		39.8	**50.0**		84.4		-34.4			
5364	0.7		2.3		42.6	**44.9**		84.4		-39.5			

Emissions Test Conditions: RADIATED EMISSIONS, FCC Part 2, Paragraph 2.993 and Part 22, Paragraph 22.917

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

☐ **- Test not applicable**

■ - 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
3115	453	Antenna, Double Ridge Guide	EMCO	9412-4363	10/03/99
3146	244	Antenna, Log Periodic Dipole	EMCO	1063	08/20/99
8566B	720	Spectrum Analyzer	Hewlett Packard	211500842	02/18/99
8566B	721	Spectrum Analyzer Display	Hewlett Packard	2112A02185	02/18/99

Remarks: _____

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

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

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:

Where, SAR = Spectrum Analyzer Reading
AF = Antenna Factor

AG = Amplifier Gain (if any)
DC = Distance Correction (if any)

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

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

dBuV/M

This result is well below the FCC and CSA Class A limit of 29.5

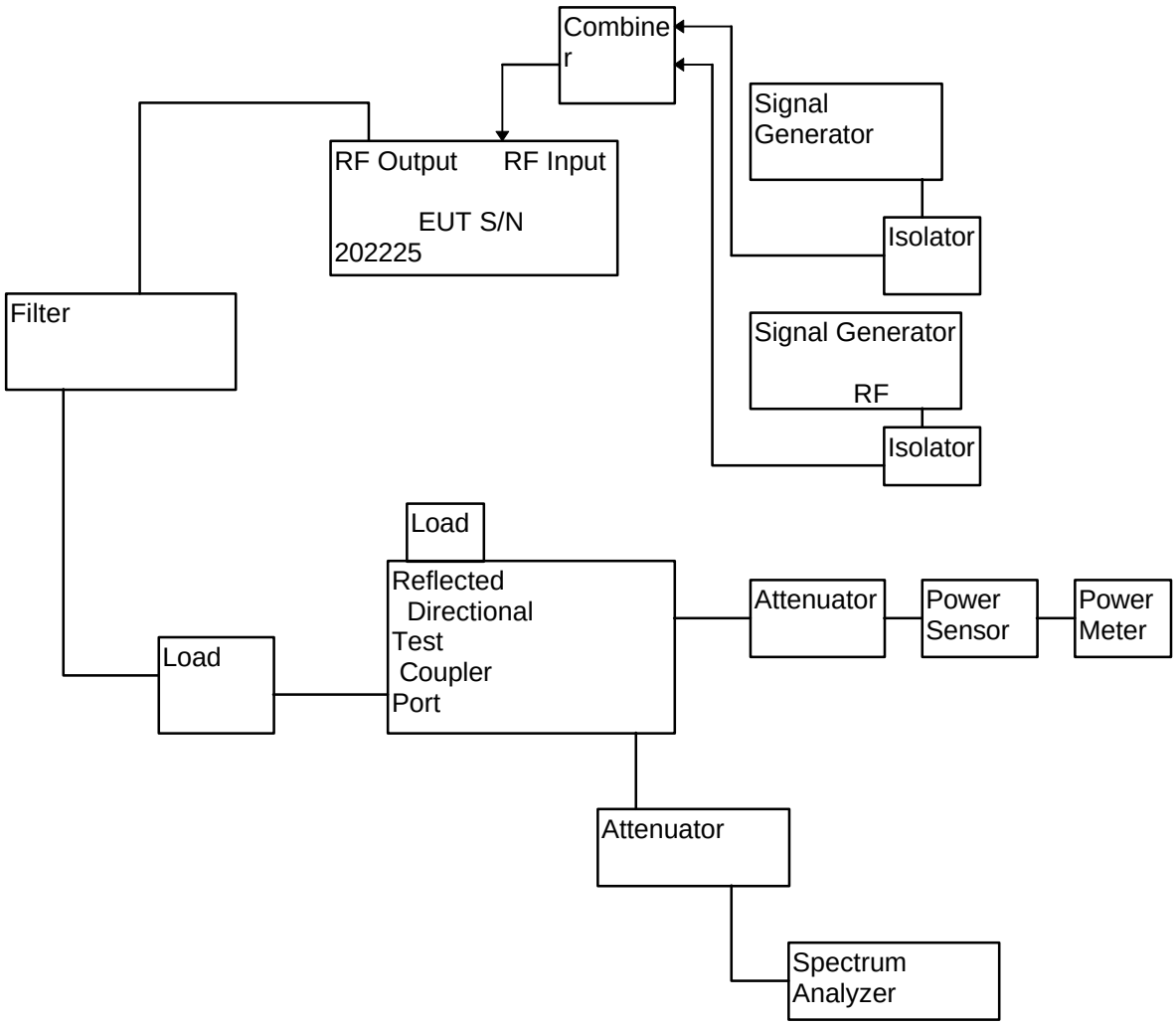
For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that

6 CONDUCTED EMISSION DATA

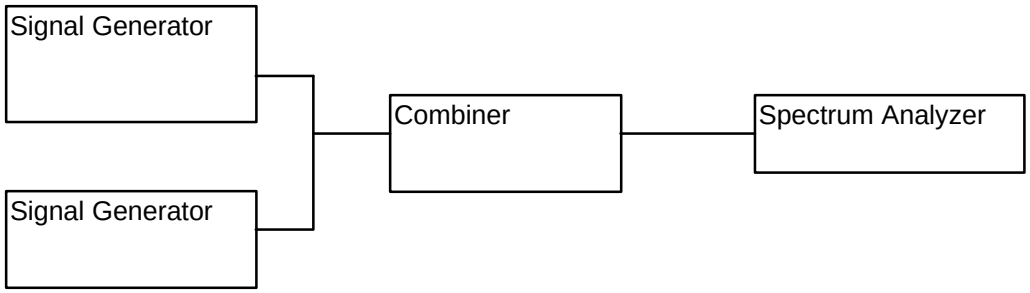
POWERWAVE TECHNOLOGIES
Multicarrier Cellular Amplifier and Subrack, Model MCA9129-90, MCR4109-1

See following page(s).

100 W Configuration Part 2, Paragraph 2.989 and 2.991 and Intermodulation



Input Plot Test Setup



Emissions Test Conditions: CONDUCTED EMISSIONS, FCC Part 2, Paragraphs 2.985, 2.989, 2.991 and Part 22, Paragraph 22.917

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

☐ - Test not applicable

■ - SR-3, Shielded Room, 12’ x 20’ x 8’, Metal Chamber

Test Equipment Used :

Equipment List, Part 2, Paragraph 2.989 and 2.991 and Intermodulation

Bandpass Filter, Ace Antenna Company, Model B.P.F. SH881T-25, S/N 9509192, NCR
Load, Weinschel, Model 53-20-34, 500 W, 20 dB, NCR
Directional Coupler, Hewlett Packard, Model HP778D, NCR
Attenuator, Weinschel, Model 33-20-34, S/N BF0474, NCR
Attenuator, Weinschel, Model 33-20-34, S/N BE6230, NCR
Power Sensor, Hewlett Packard, Model 8481A, S/N 3318A97982, Cal Date 6/99
Power Meter, Model 437B, S/N 3125024892, Cal Date 4/99
Spectrum Analyzer, P/N 720, 721, Model 8566B, S/N 2115A00842, Cal Date 02/18/99
Signal Generator, S/N US38330318, Model E4433B, Cal Date 8/99
Signal Generator, S/N US383303812, Model E4433B, Cal Date 8/99

Remarks: _____

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

TEST: RF Output Power

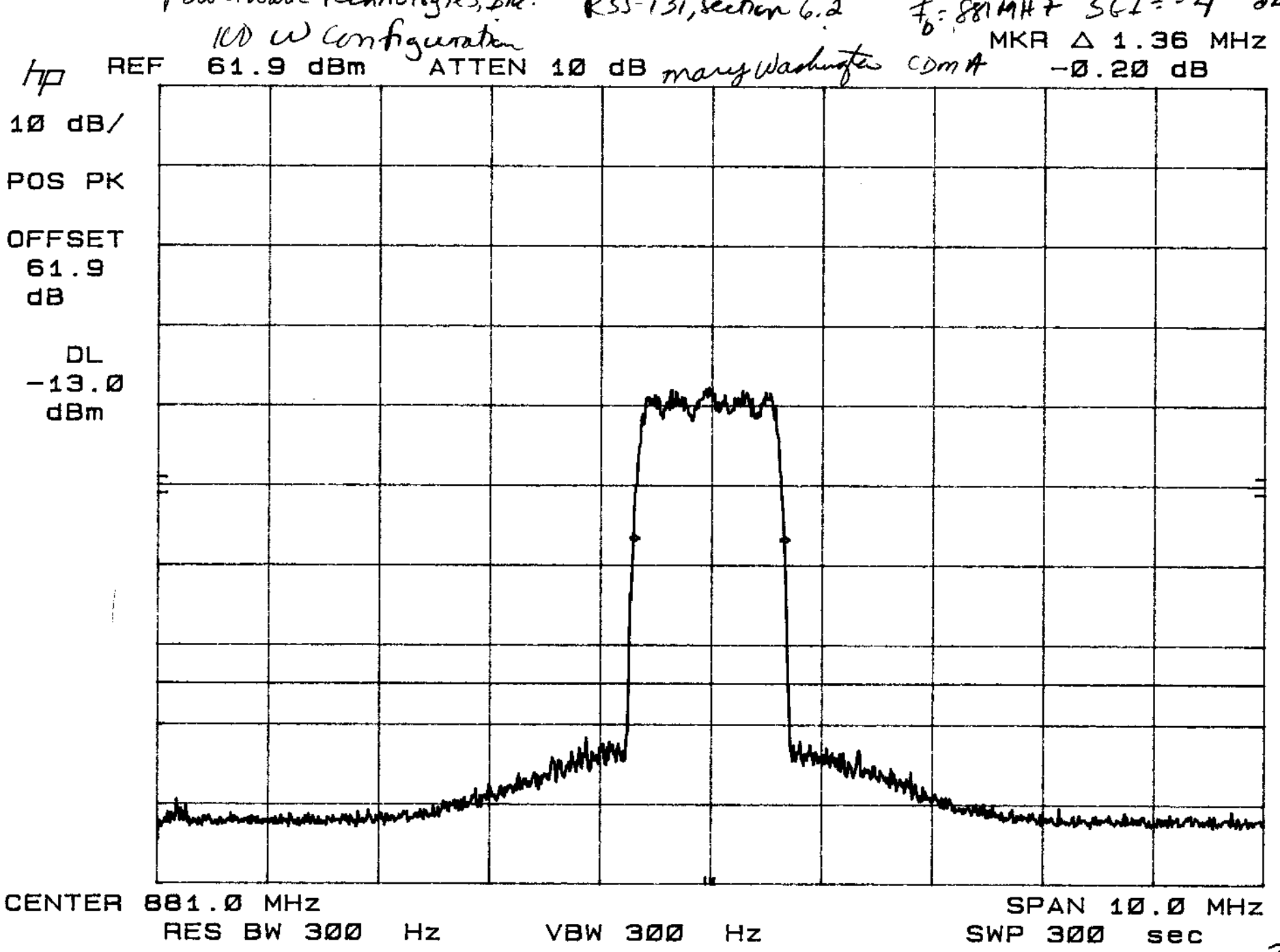
CUSTOMER: CUBIC COMMUNICATIONS, INC.

EUT: Model CTX-5000 5 kW HF Transmitter

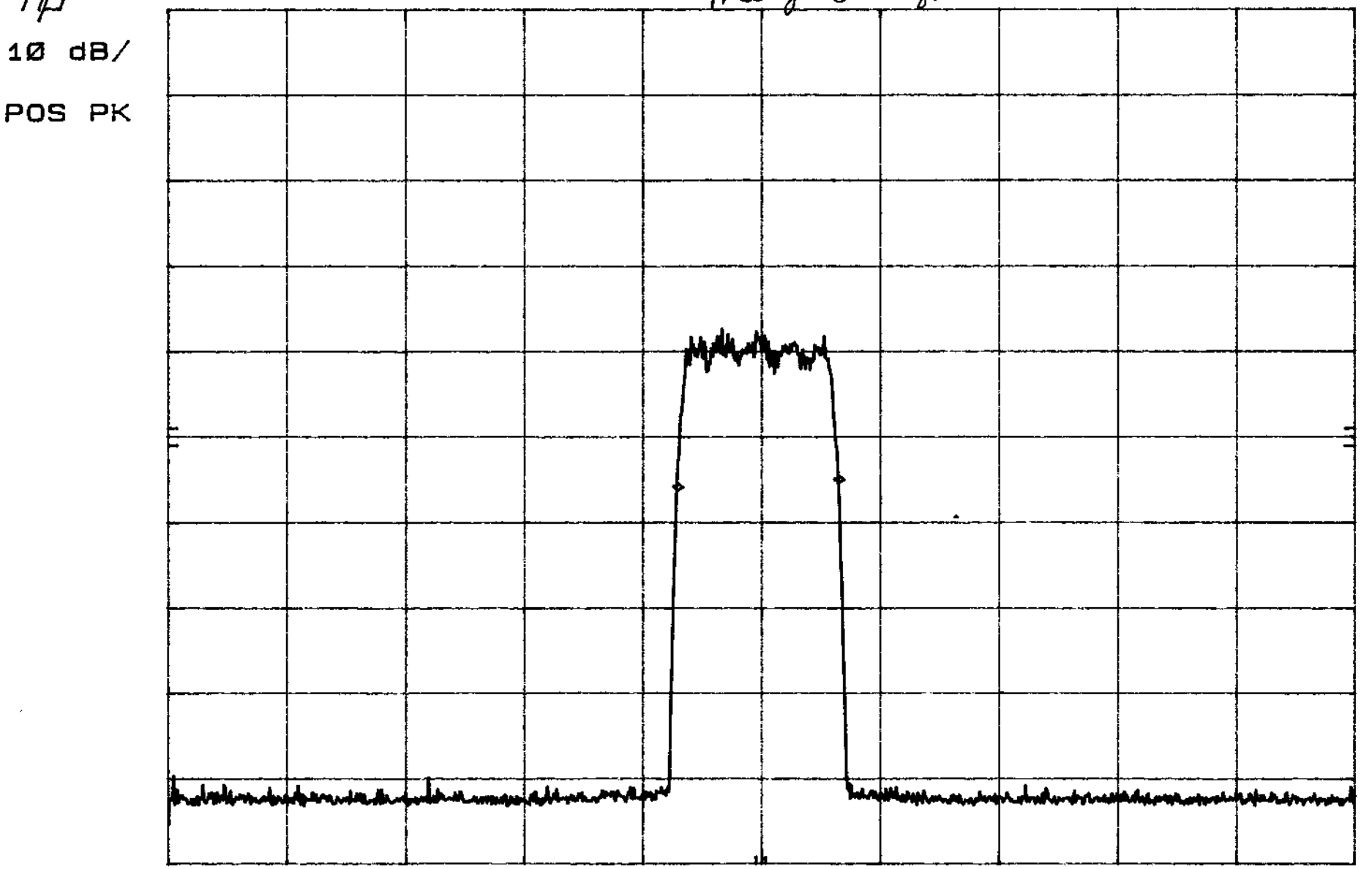
SPECIFICATION: FCC Part 2, Paragraph 2.985 and Part 22, Paragraph 22.917

Frequency (MHz)	Modulation	Output Power	Configuration
Tested 2/2/99			Outside rack
869 and 894	CDMA	100W	Outside rack
869 and 894	TDMA	100W	Outside rack
869 and 894	Amps (voice)	100W	Outside rack
Tested 2/4/99			
869 and 894	Amps (data)	100W	Outside rack
869 and 894	CDMA	90W	Inside rack
869 and 894	TDMA	90W	Inside rack
869 and 894	Amps (voice)	90W	Inside rack
869 and 894	Amps (data)	90W	Inside rack
869 and 894		90W	Inside rack

2/2/99 S9046 FCC Part 2, Para. 2.989 & 22.917
Powerwave Technologies, Inc. RSS-131, Section 6.2 f_o: 881 MHz SG1 = -4 dBm
100 W Configuration



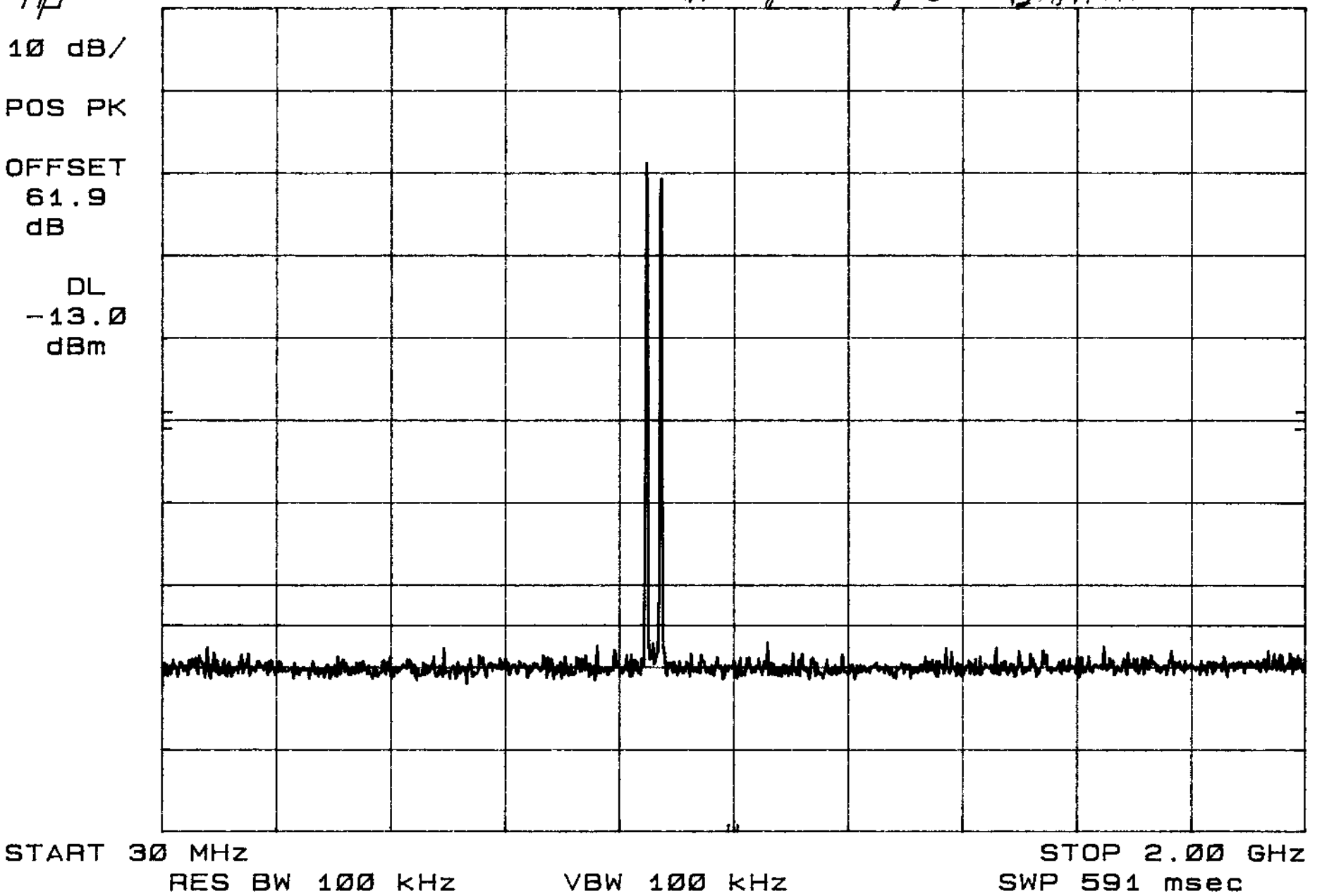
2/2/99 S9046 SG1 = -4 dBm
Powerwave Technologies, Inc. Input plot f_0 = 881 MHz cdmA
100 W configuration
MKR Δ 1.36 MHz
hp REF 0.0 dBm ATTEN 10 dB Mary Washington 0.90 dB



2/2/99
Powerwave Technologies, Inc.
100 W Configuration

S9046
RSS-131, Section 6.6
Spurious Emissions
Mary Washington

CDMA
SG1 = -4 dBm
SG2 = -6.82 dBm
f_1 = 869 MHz
f_2 = 894 MHz

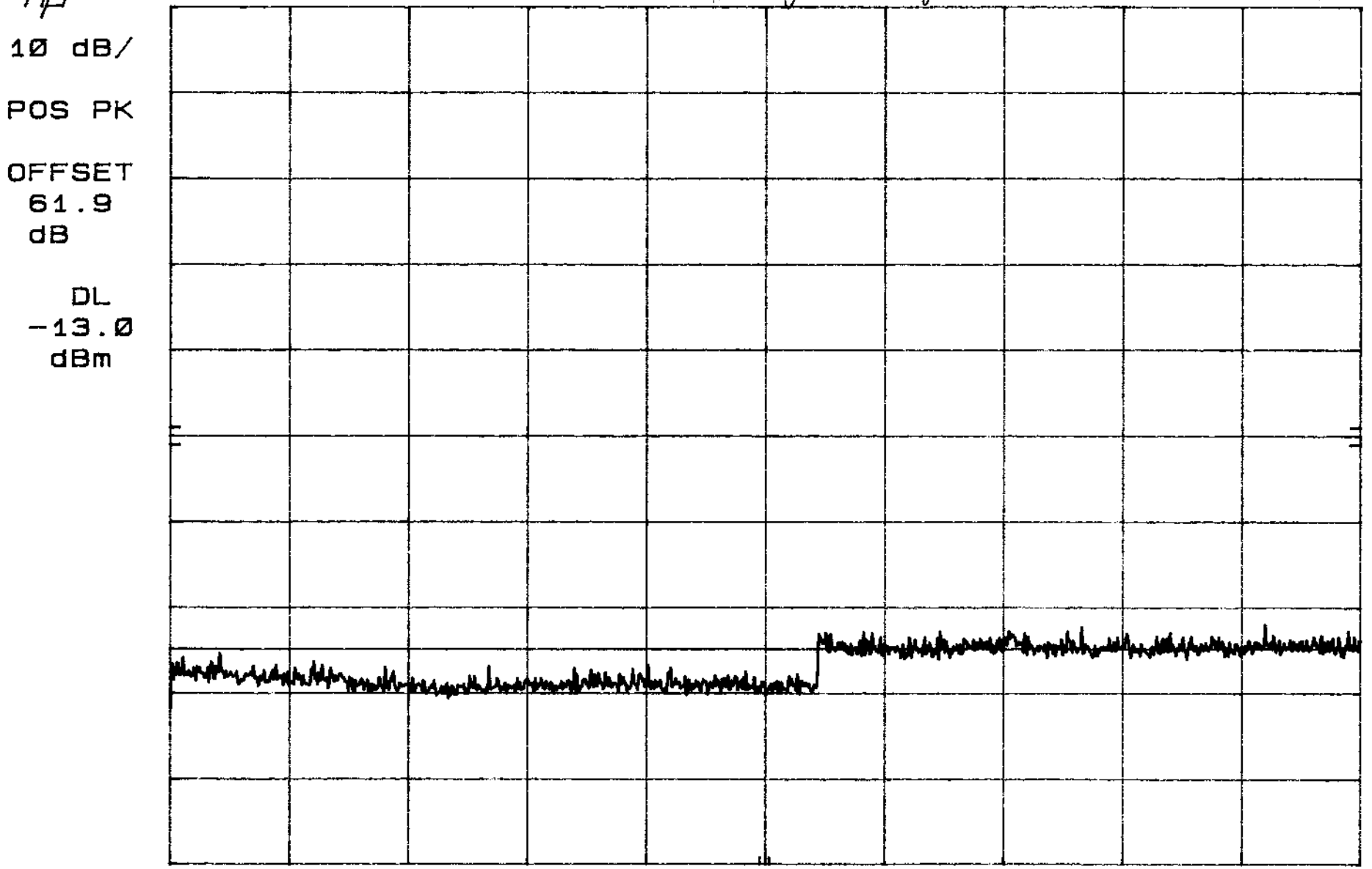


2/2/99
Powerwave Technologies, Inc.
100 W Configuration

59046
RSS-131, Section 6.6
Spurious Emissions

CDMA SG1 = -4 dBm
f_1 = 869 MHz SG2 = -7.82 dBm
f_2 = 894 MHz

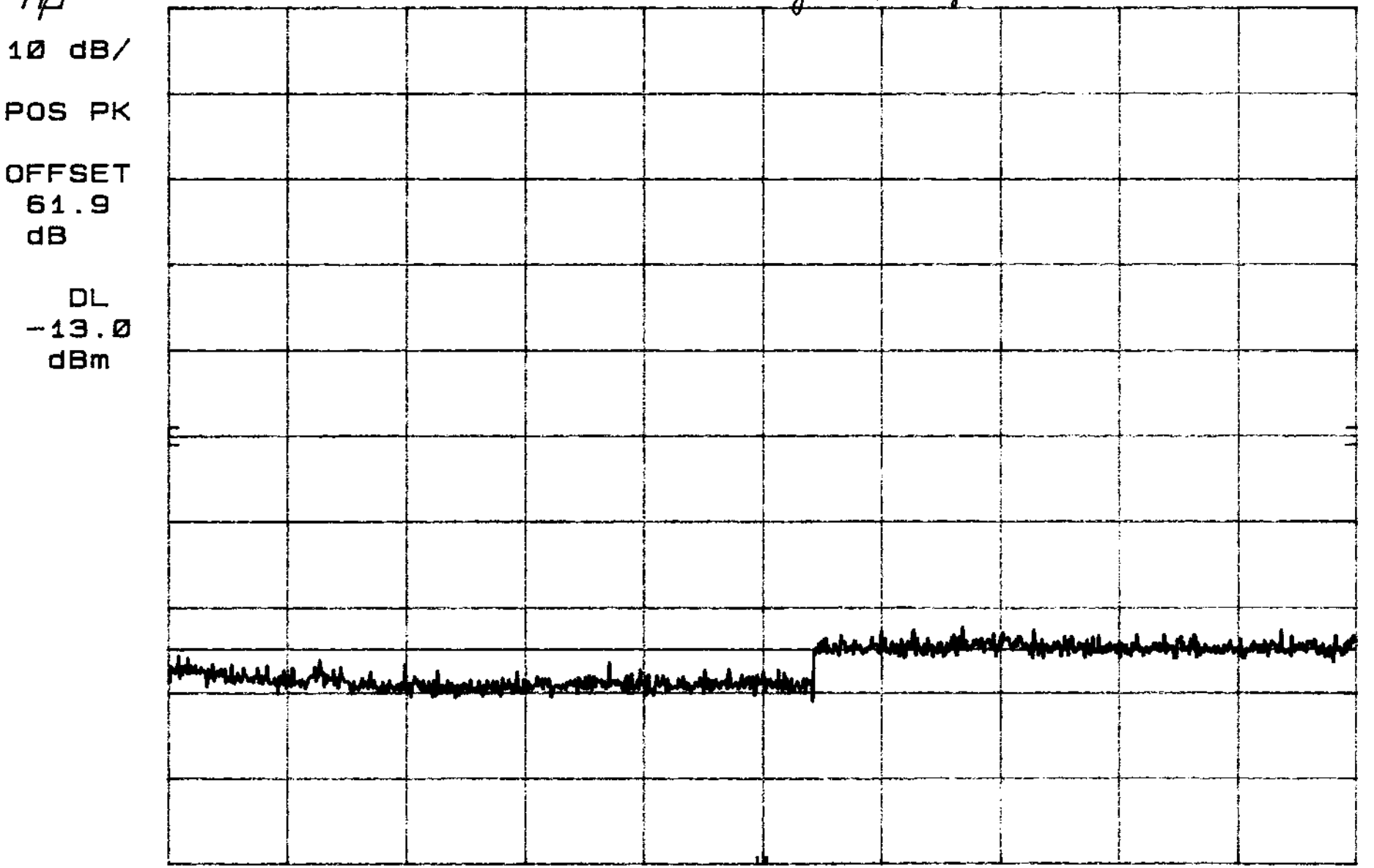
Output to spectrum analyzer



2/4/99 59046 Rawemake

No input to spectrum analyzer

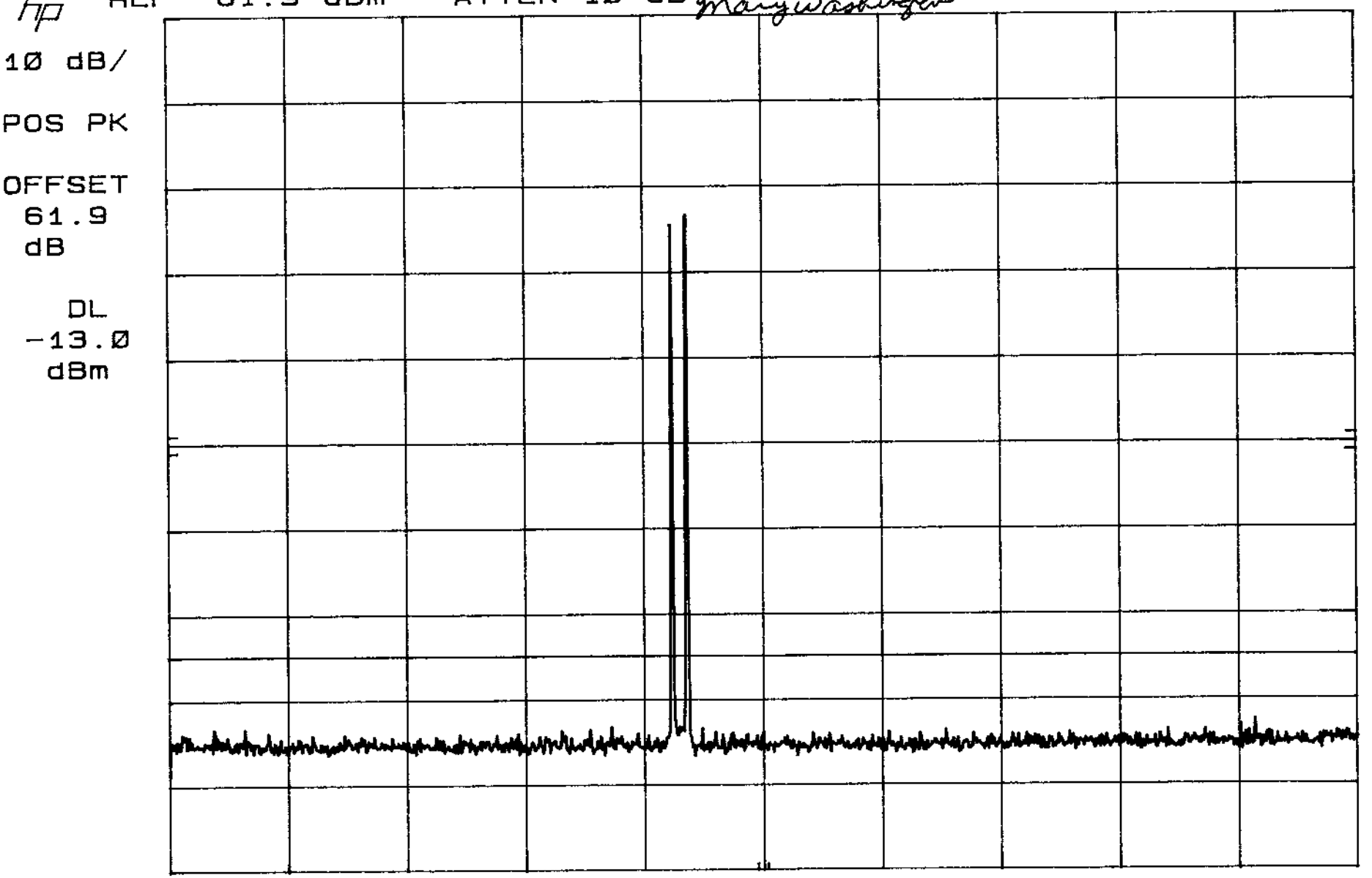
hp REF 61.9 dBm ATTEN 10 dB - mary Washington



2/2/99
Powerwave Technologies, Inc.
100W configuration

S9046
2.991 & 22.917
Spurious
CDMA
Mary Washington

f_1 = 869 MHz SG1 = -4 dBm
f_2 = 894 MHz SG2 = -7.82 dBm



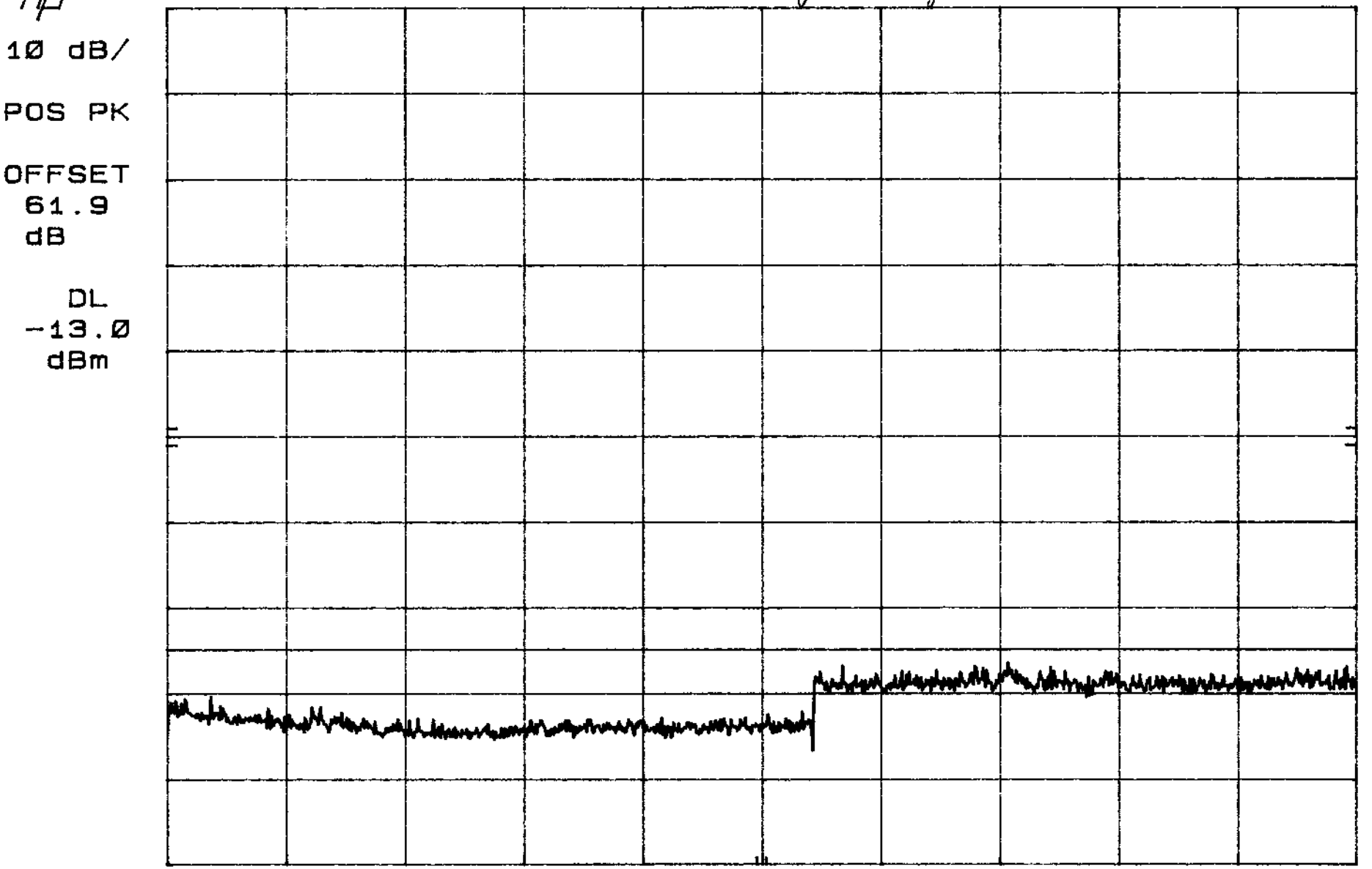
2/2/99
Powerwave Technologies
100 W configuration

S9046 §2.991 & 22.917
RSS-131, Section 6.6
Spurious Emissions

CDMA
f_1 = 869 MHz
f_2 = 894 MHz

SG1 = -4 dBm
SG2 = -6.82 dBm

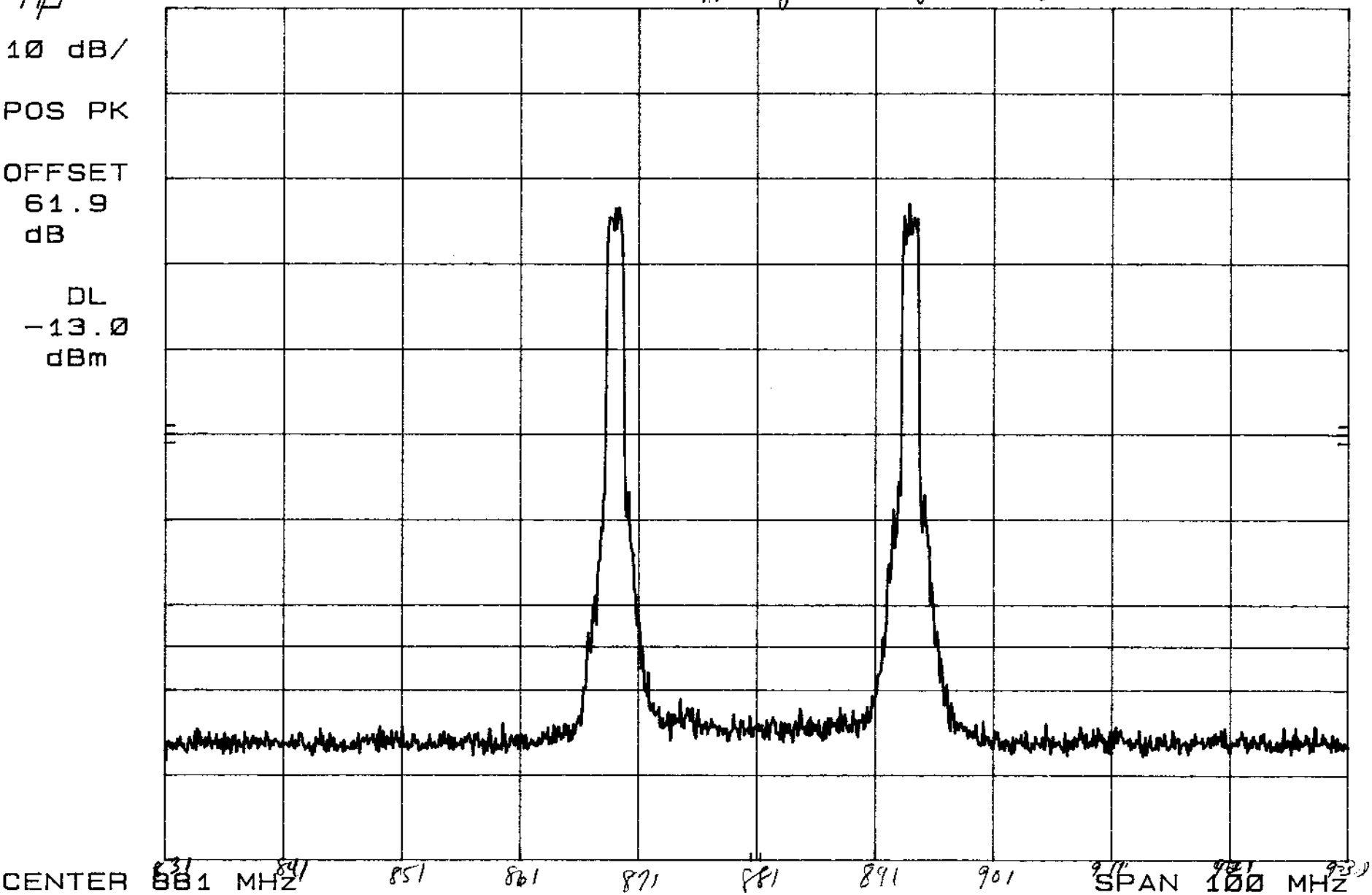
Mary Washington



2/2/99
Powerwave Technologies, Inc.
100 W configuration

5904b
3rd Intermodulation
CDMA
mary washington

SG1 = -4 dBm
SG2 = -6.82 dBm
f_1 = 869 MHz
f_2 = 894 MHz

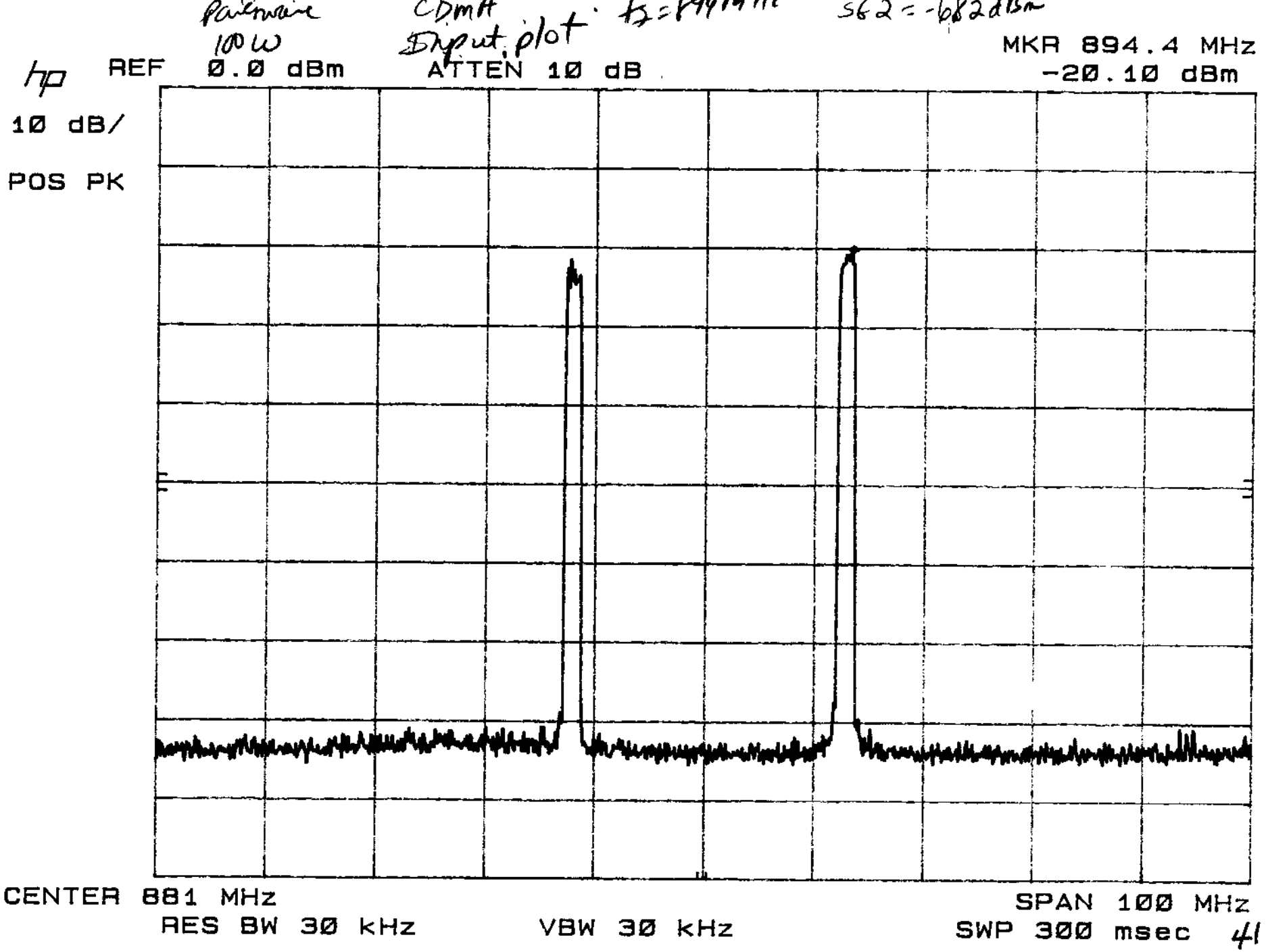


2/4/99
Powerwave
100 W

S9076
CDMA
Input plot

$f_1 = 869$ MHz
$f_2 = 894$ MHz

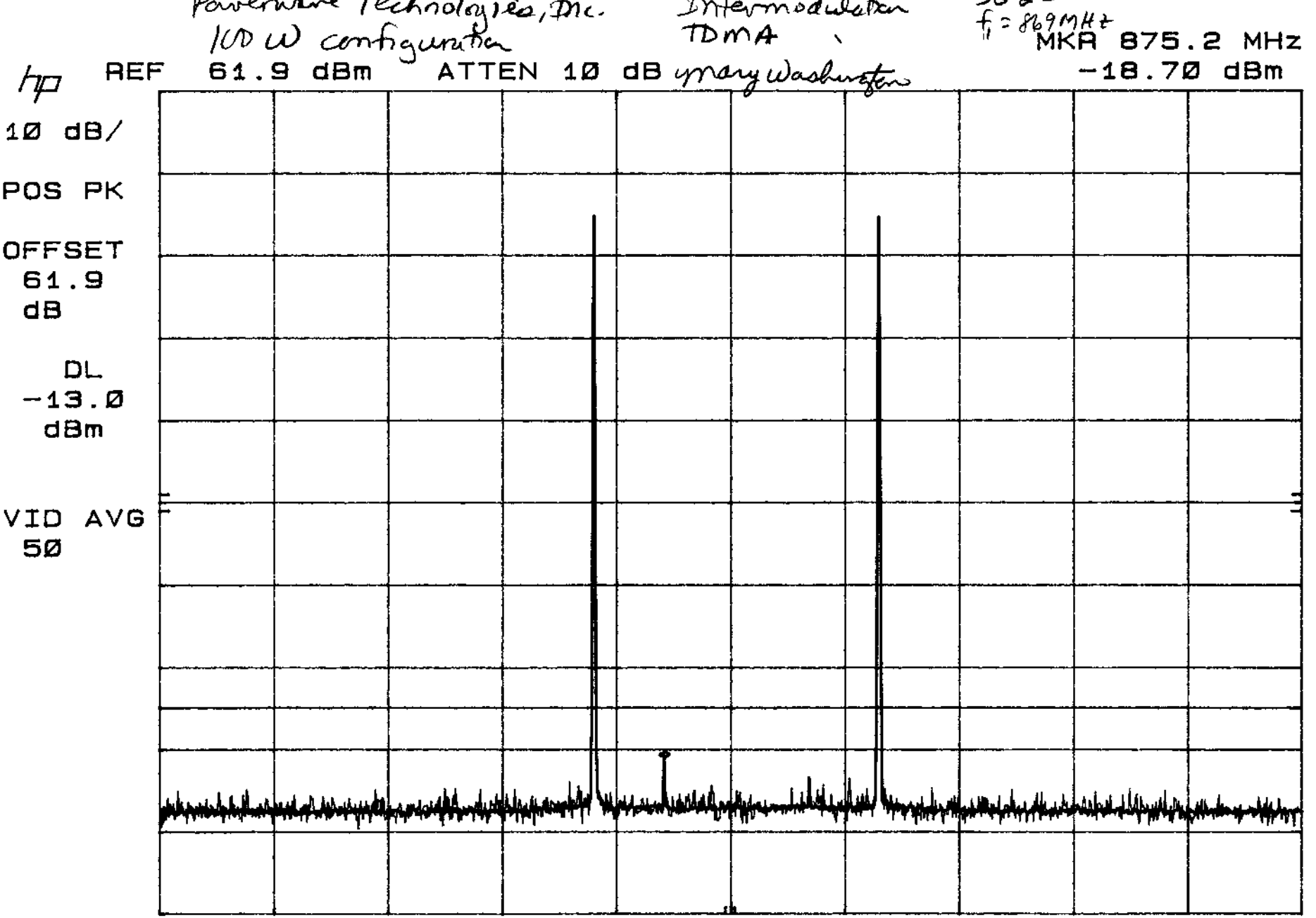
SG1 = -4 dBm
SG2 = -6.82 dBm



2/2/99
Powerwave Technologies, Inc.
100 W configuration

S9046
Intermodulation
TDMA

SG1 = -6.96 dBm
SG2 = -6.72 dBm
f_1 = 869 MHz
f_2 = 894 MHz



Mary Washington

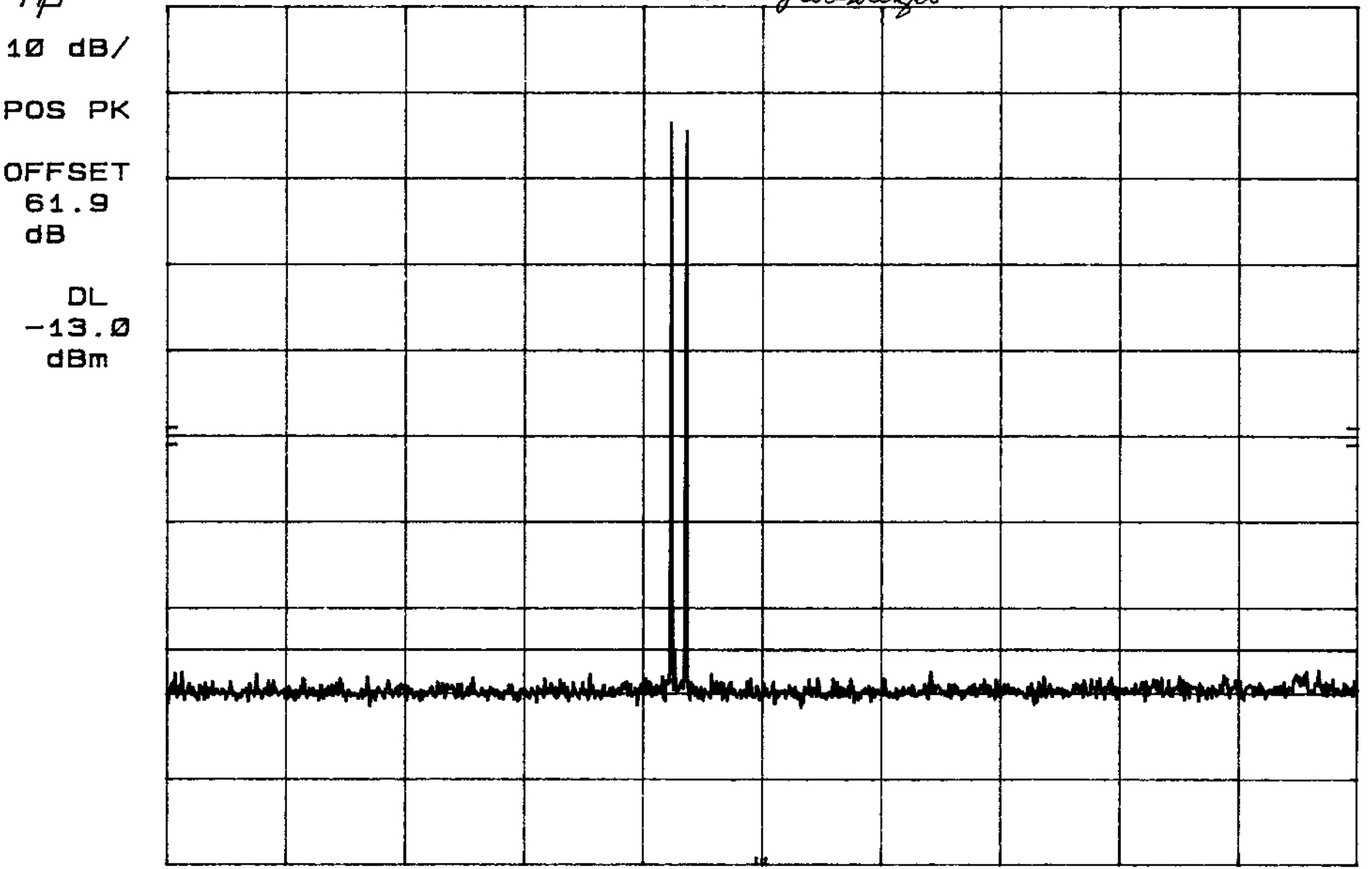
2/2/99
Powerwave
100 W

S9096
RSS-131, Sect. 6.6
Spurious Emission

TDMA
f_1 = 869 MHz
f_2 = 894

SG1 = -6.96 dBm
SG2 = -6.72 dBm

hp REF 61.9 dBm ATTEN 10 dB mary washington

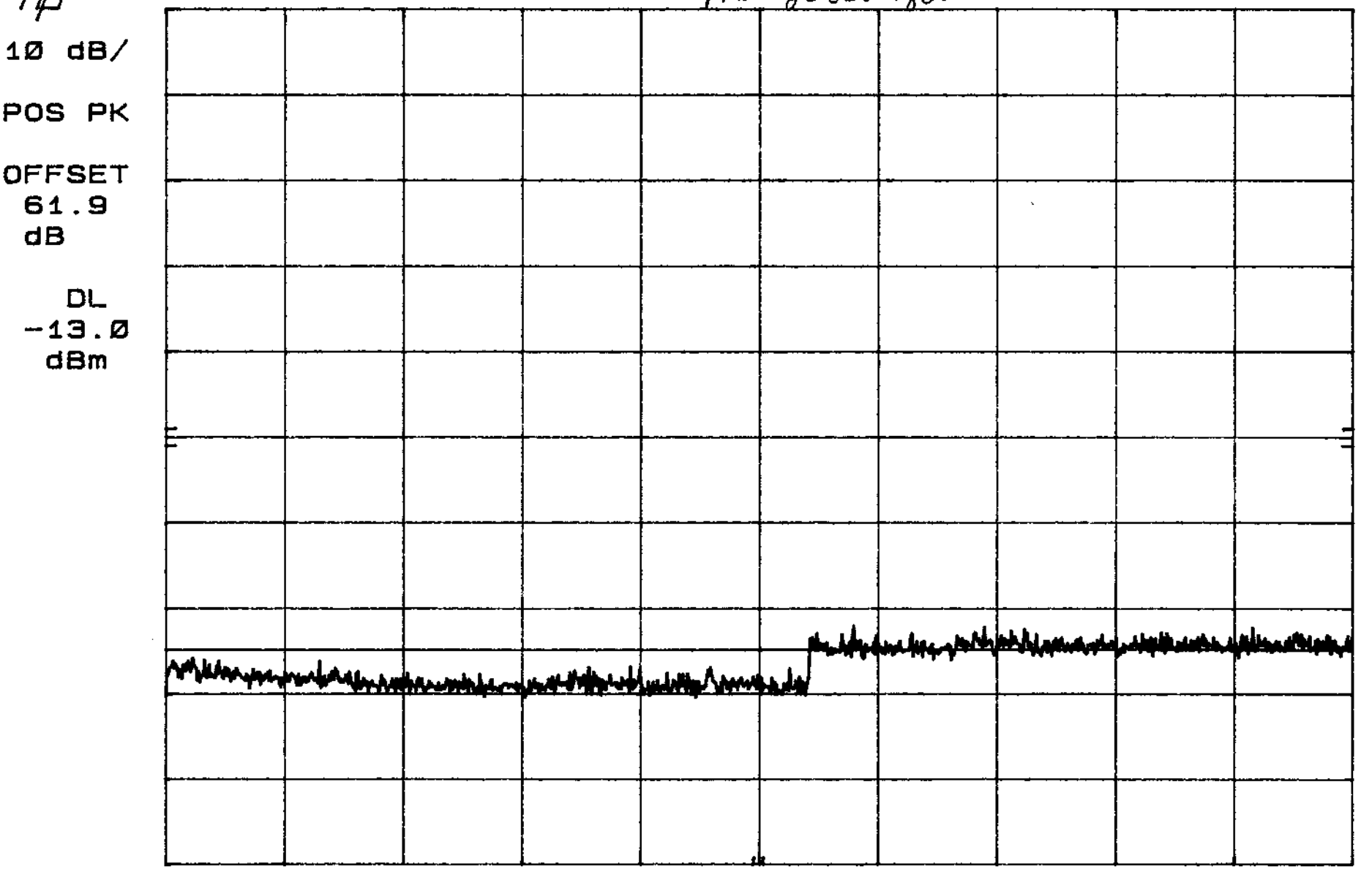


2/2/99
Powerwave
100 W configuration

59046
RSS-131, 6.6

TDMA
f_1 = 869 MHz
f_2 = 894 MHz

Input to spectrum analyzer
SG1 = -6.96 dBm
SG2 = -6.72 dBm



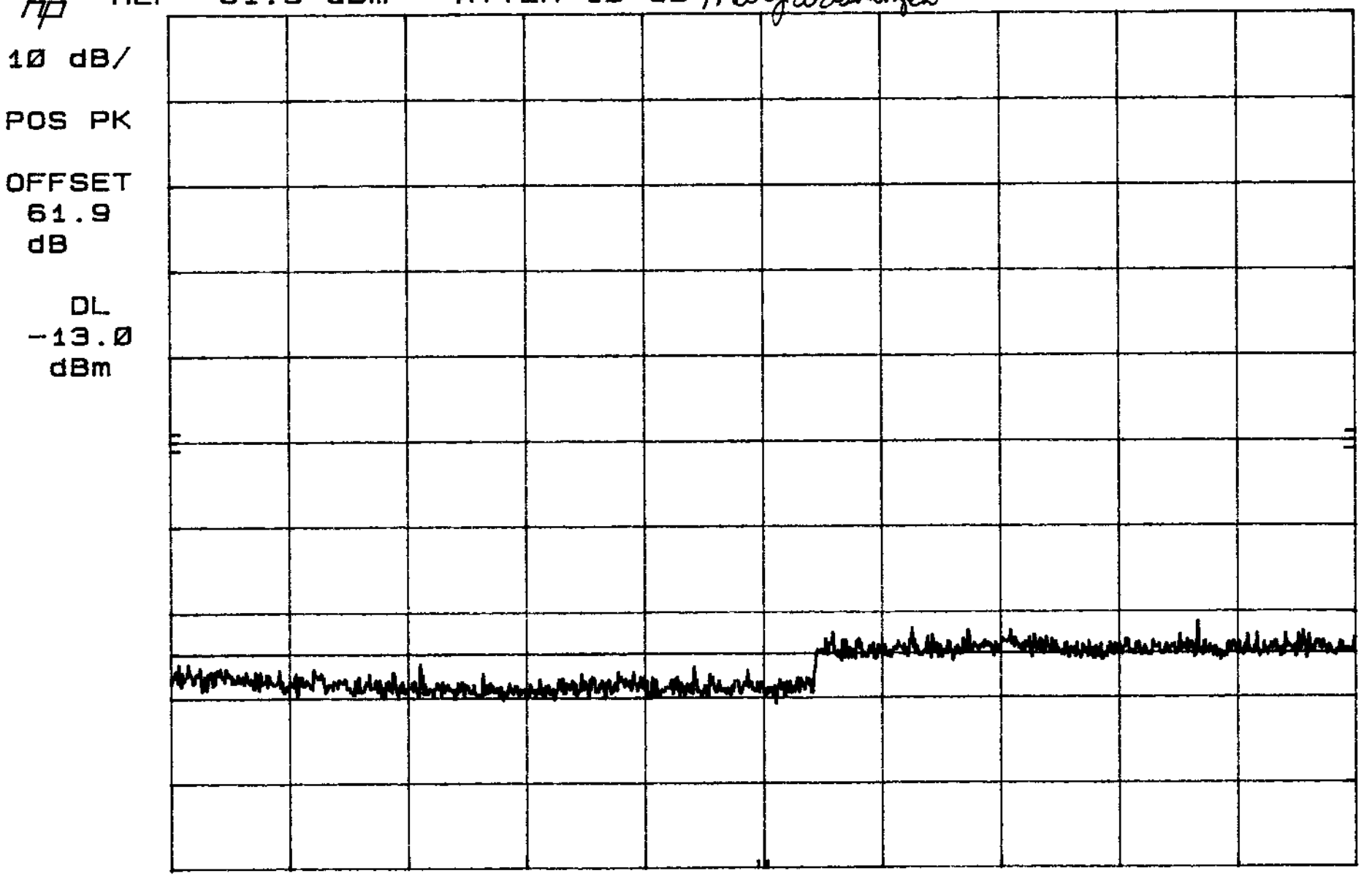
44

2/2/99
Powerwave
(100 W configuration

S9046
RSS-131, 6.6
Spurious

No input to spectrum analyzer

Mary Washington



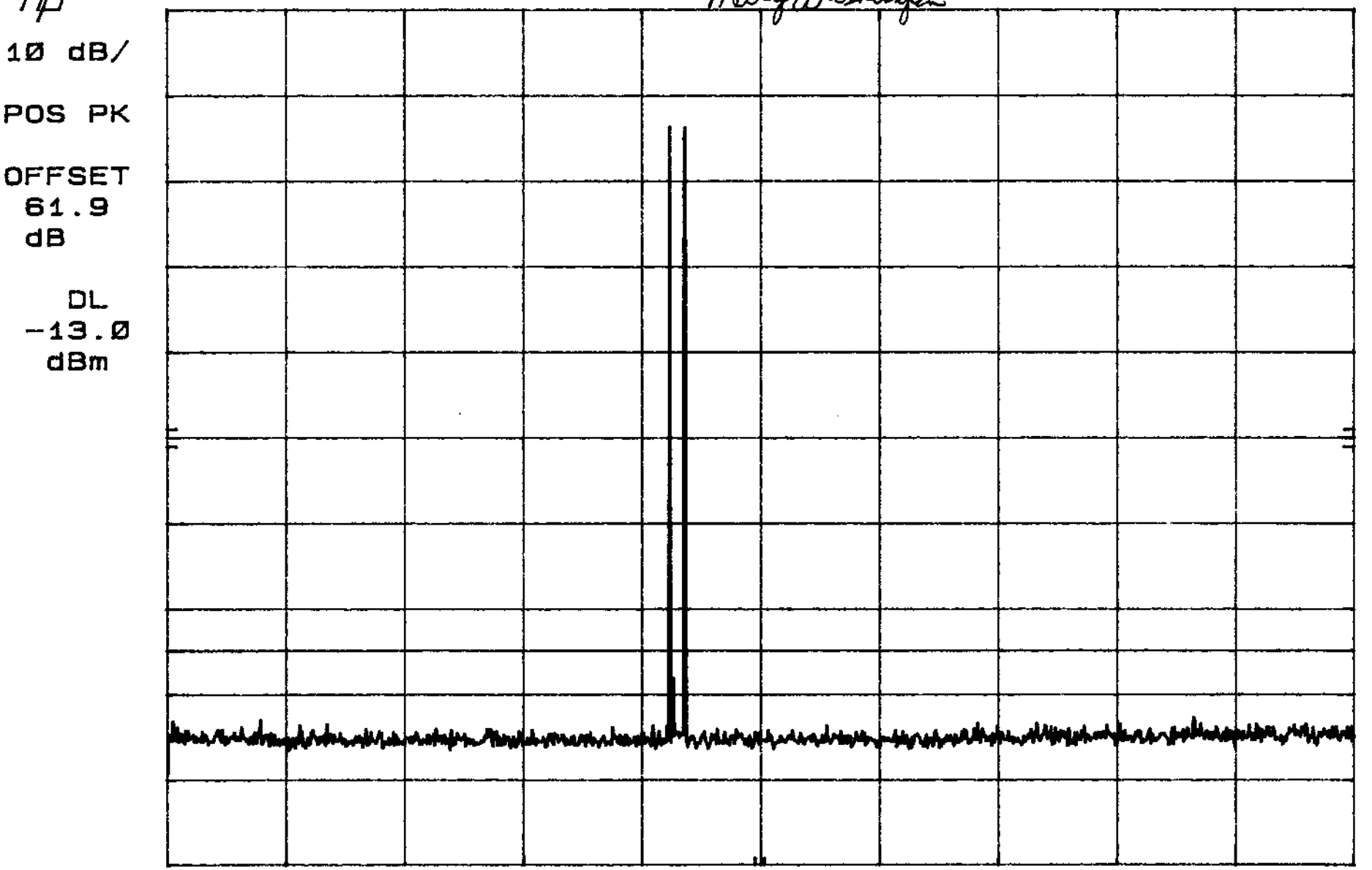
2/2/99
Powerwave
100 W configuration

S9046
2.991 ↓ 22.917
Spurious Emissions

TDMA
f_1 = 869 MHz
f_2 = 894 MHz

SG1 = -6.96 dBm
SG2 = -4.72 dBm

Mary Washington



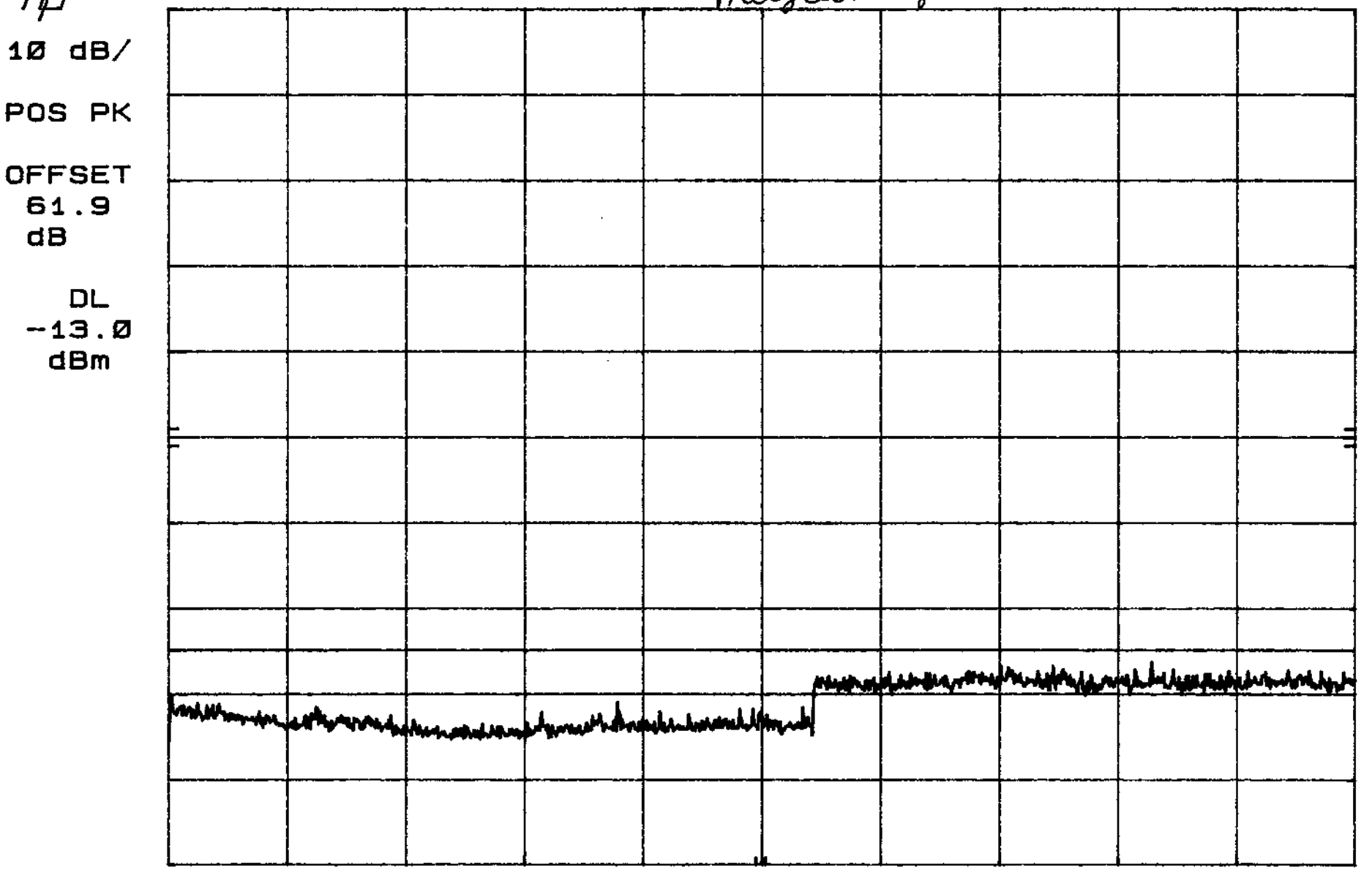
2/2/99
Powerwave
100 W configuration

S9046
2.991d 22.917
spurious

TDMA f_2 = 894 MHz
f_1 = 869 MHz

SG1 = -6.96 dBm
SG2 = -6.72 dBm

mary Washington

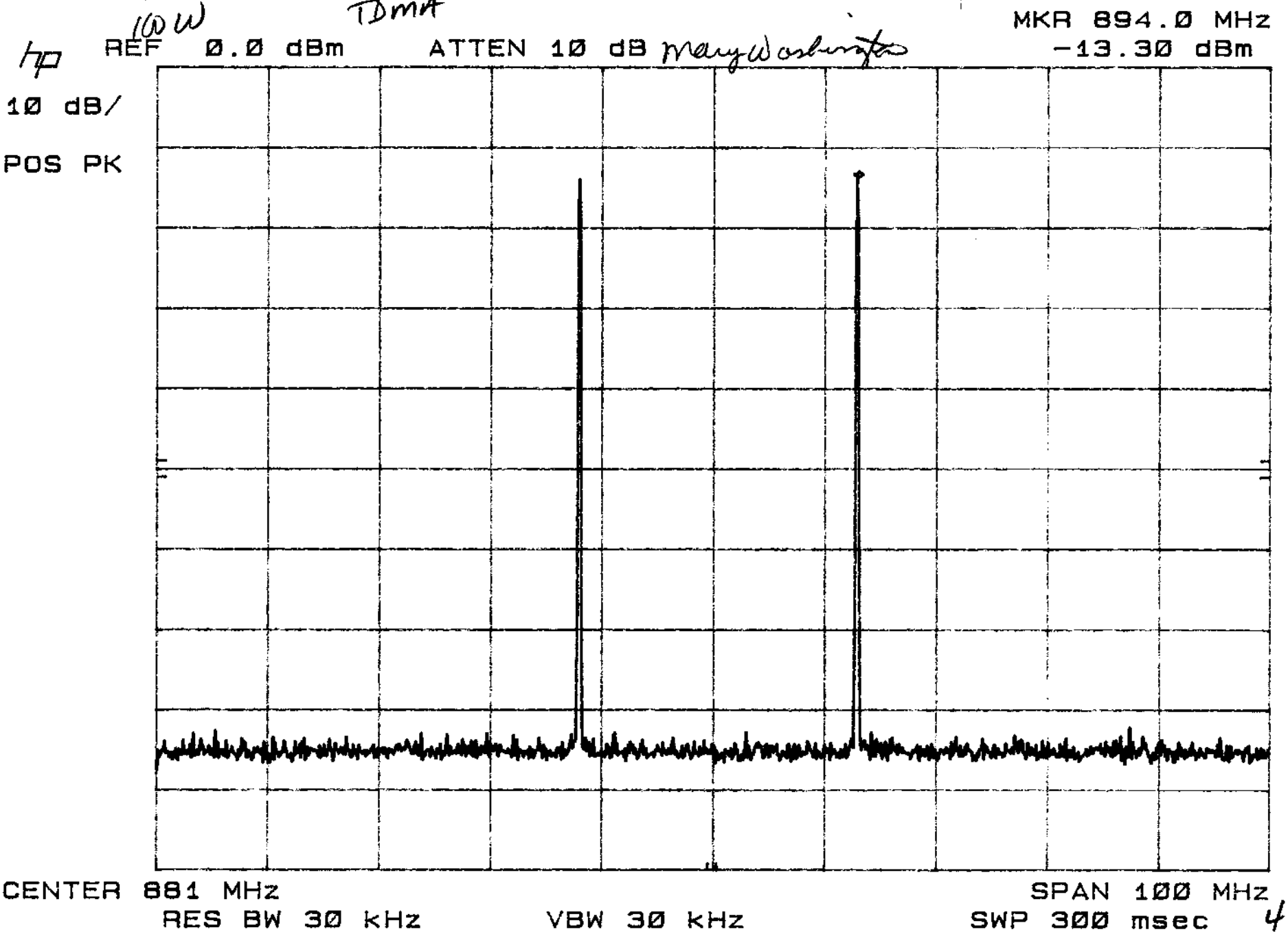


2/4/99 Powerwave 100 W

59046 Input Plot TDMA

SG1 = -6.96 dBm f_1 = 869 MHz

SG2 = -6.72 dBm f_2 = 894 MHz

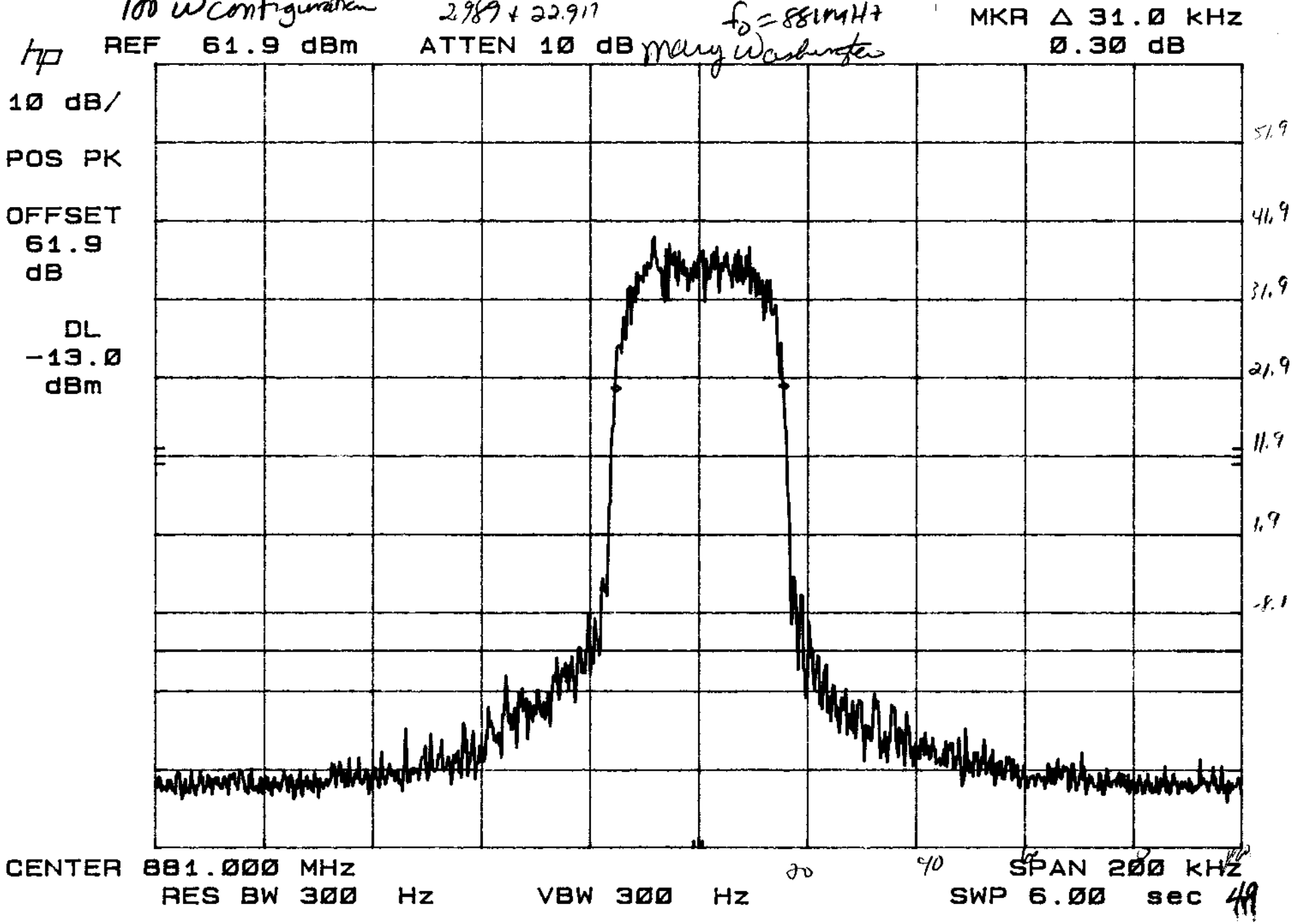


2/2/99
Powerwave
100 W configuration

39046
RSS-131, Section 2
2989 + 22.917

TDMA
S61 = -4 dBm
f_0 = 881.94 MHz

Mary Washington



49

2/2/99
Powerwave Technologies, Inc.
100 W configuration

S90% Digital plot

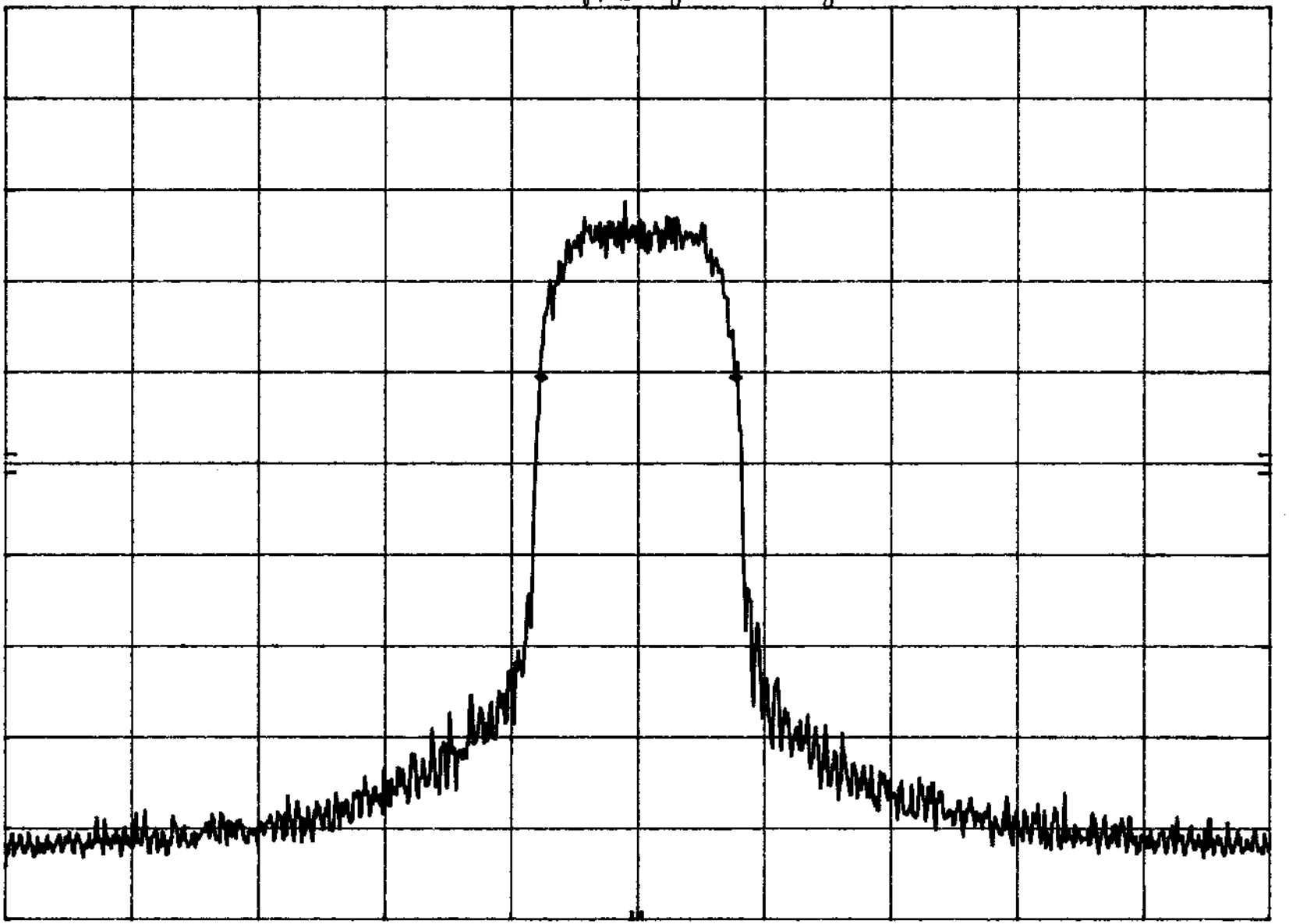
S67 = -3.92 dBm
fo = 881 MHz TDMA

MKR Δ 30.8 kHz
0.00 dB

hp REF 0.0 dBm ATTEN 10 dB mary washington

10 dB/

POS PK



CENTER 881.000 MHz
SPAN 200 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 6.00 sec

50

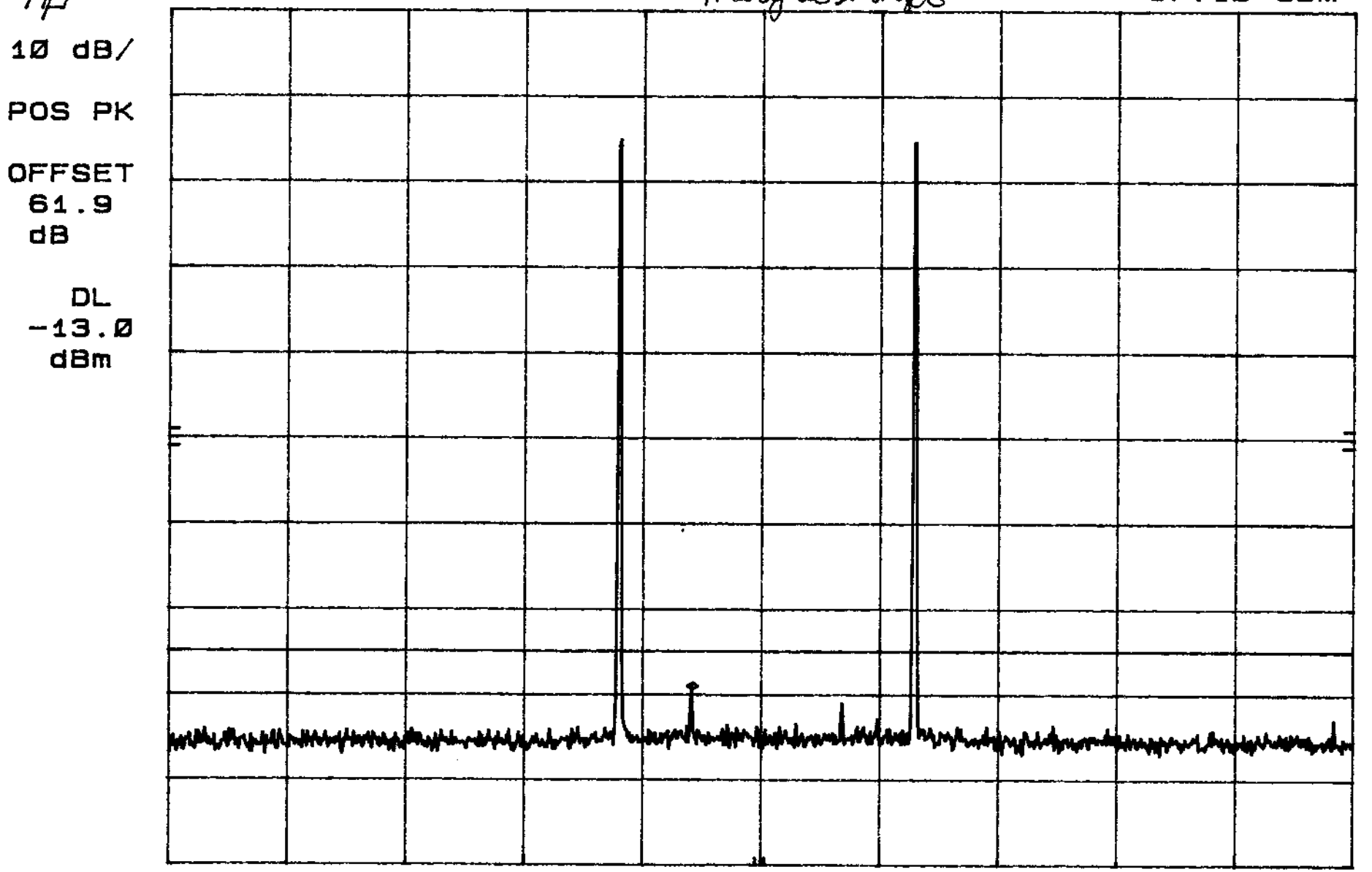
2/2/99
Powerwave
100 W configuration

S9046
Intermodulation
AMPS Voice

f_1 = 869 MHz SG1 = -7.08 dBm
f_2 = 894 MHz SG2 = -6.66 dBm

MKR 875.2 MHz
-17.10 dBm

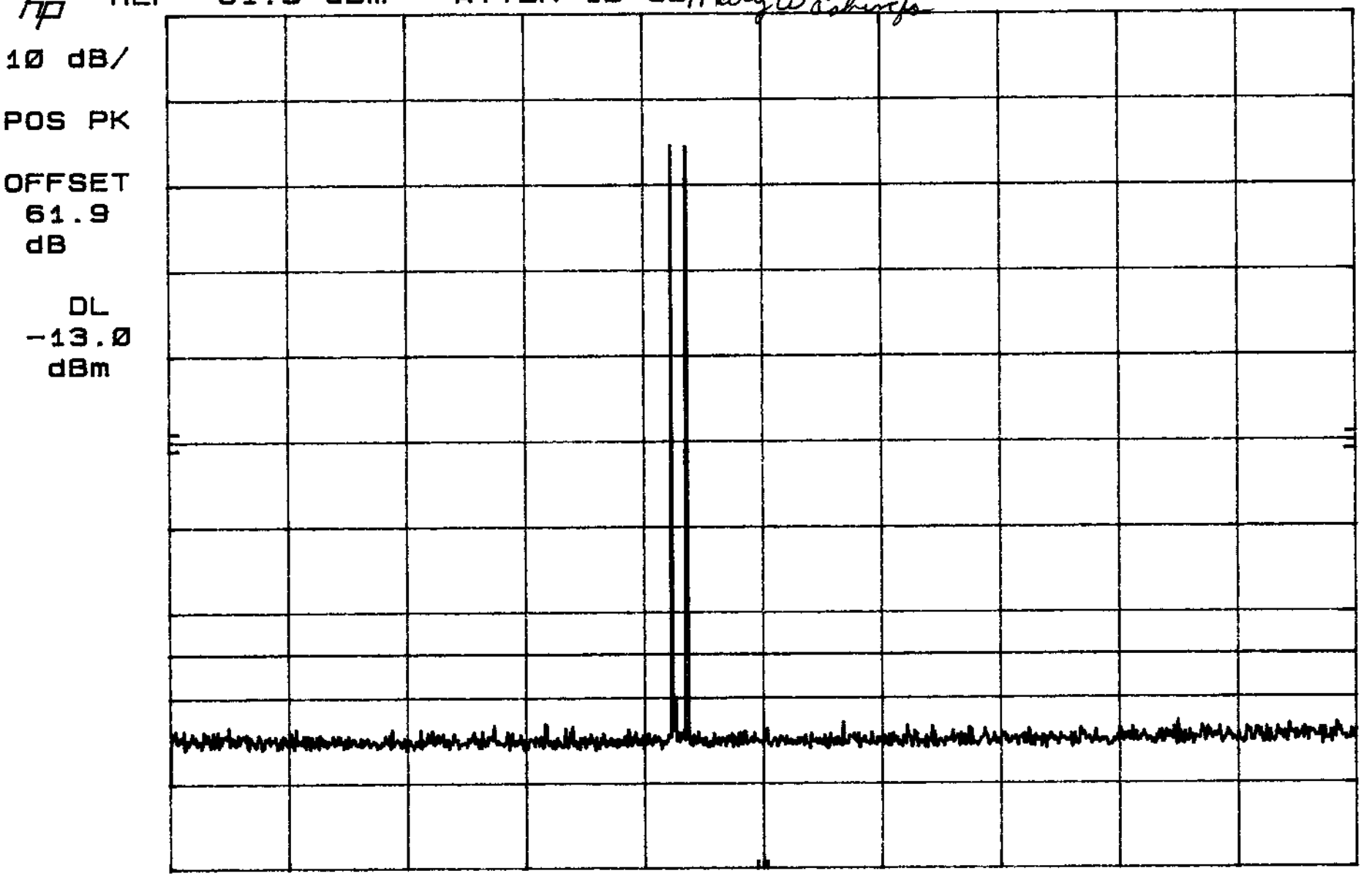
REF 61.9 dBm ATTEN 10 dB Mary Washington



CENTER 881 MHz
SPAN 100 MHz
RES BW 30 kHz
VBW 30 kHz
SWP 300 msec

51

2/2/99 S9096 Amps Voice
Powerware 2.991 & 22.917
100 W configuration Spurious Emissions
f_1 = 869 MHz SG1 = -7.08 dBm
f_2 = 894 MHz SG2 = -6.46 dBm
Mary Wahnfo

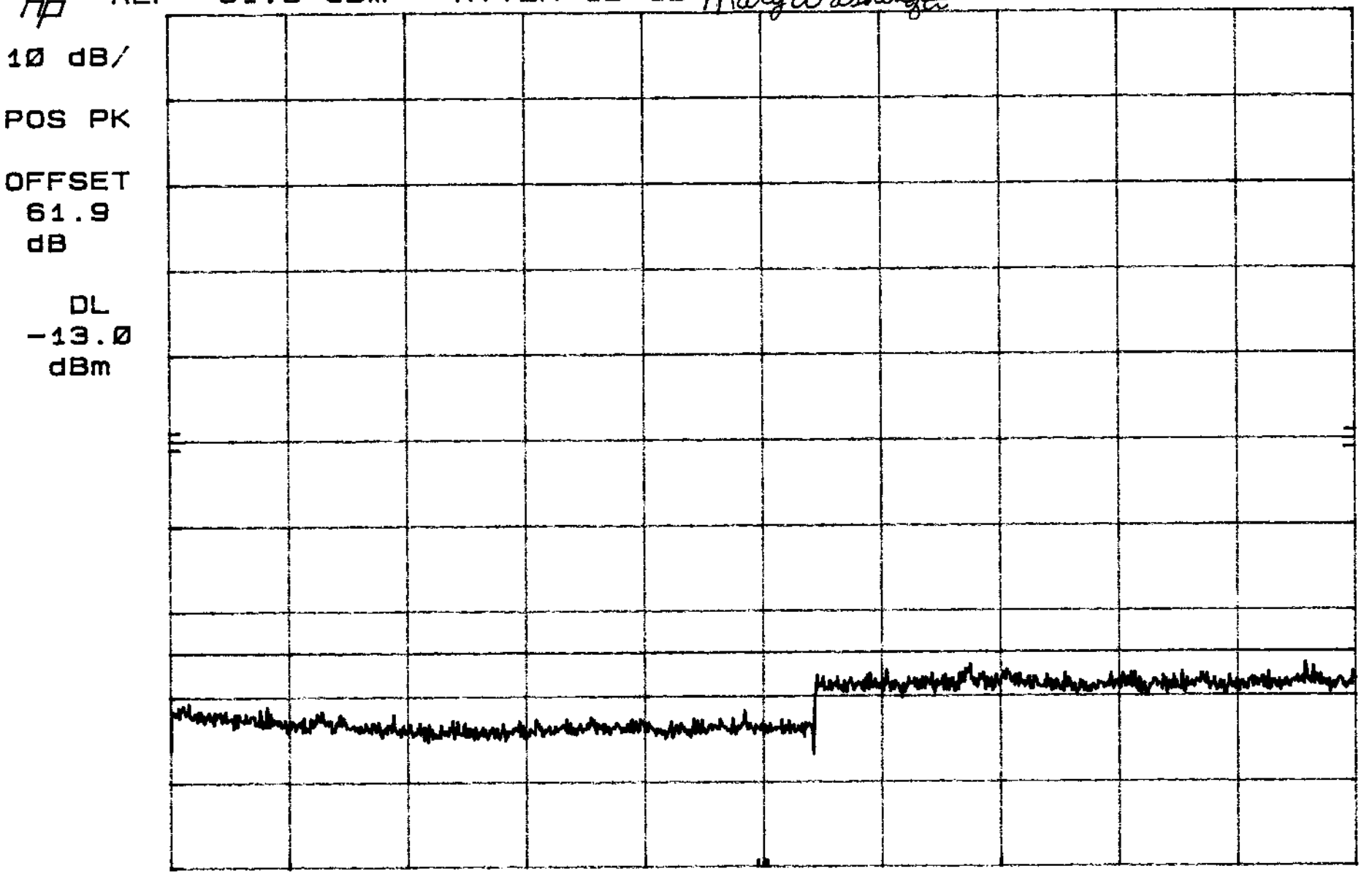


2/2/99
Powerwave
100 W configuration

S9046
2.994 22.917
spurious

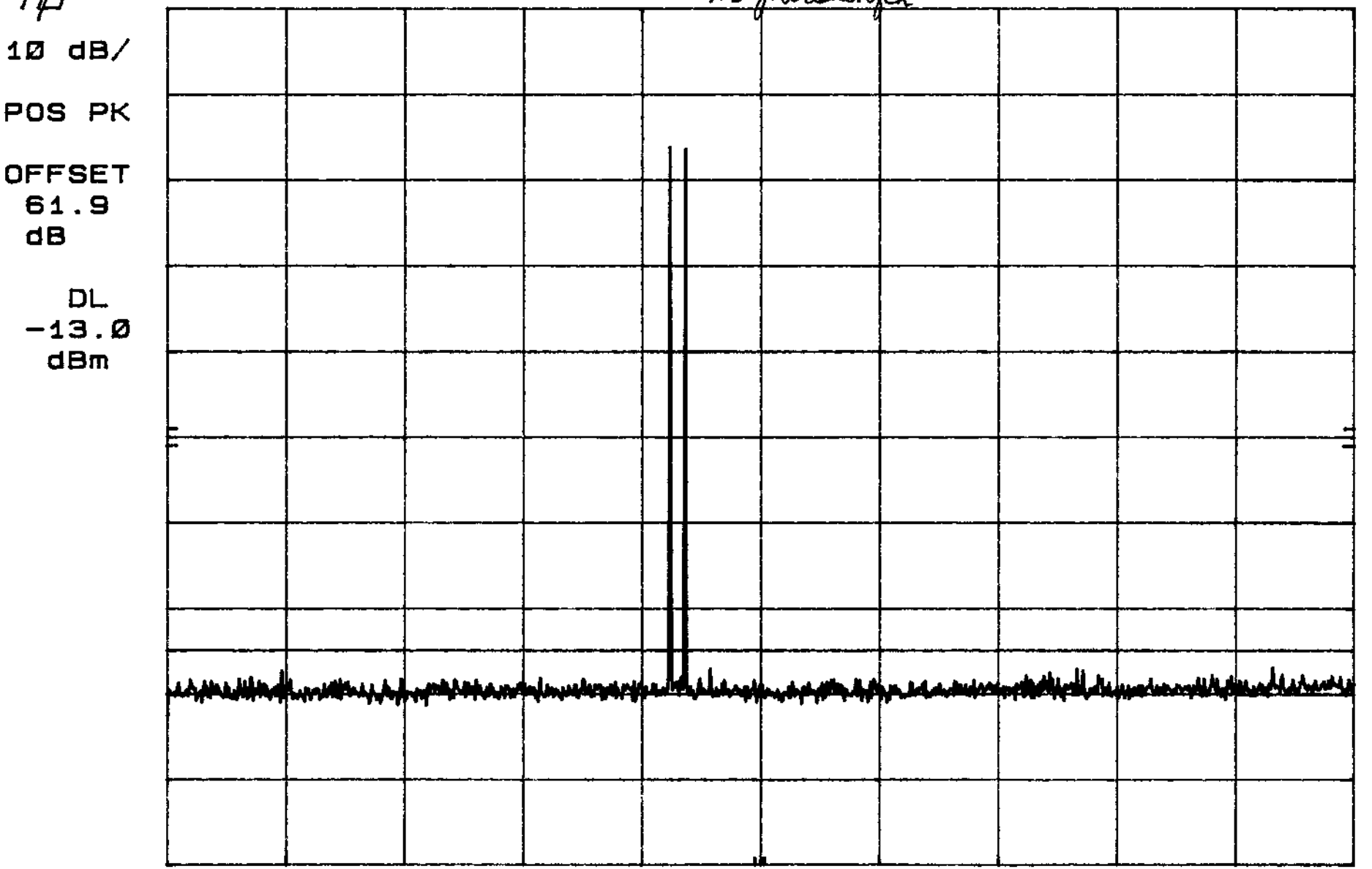
AMPS Voice
f_1 = 869 MHz
f_2 = 894 MHz

SG1 = -7.08 dBm
SG2 = -6.66 dBm



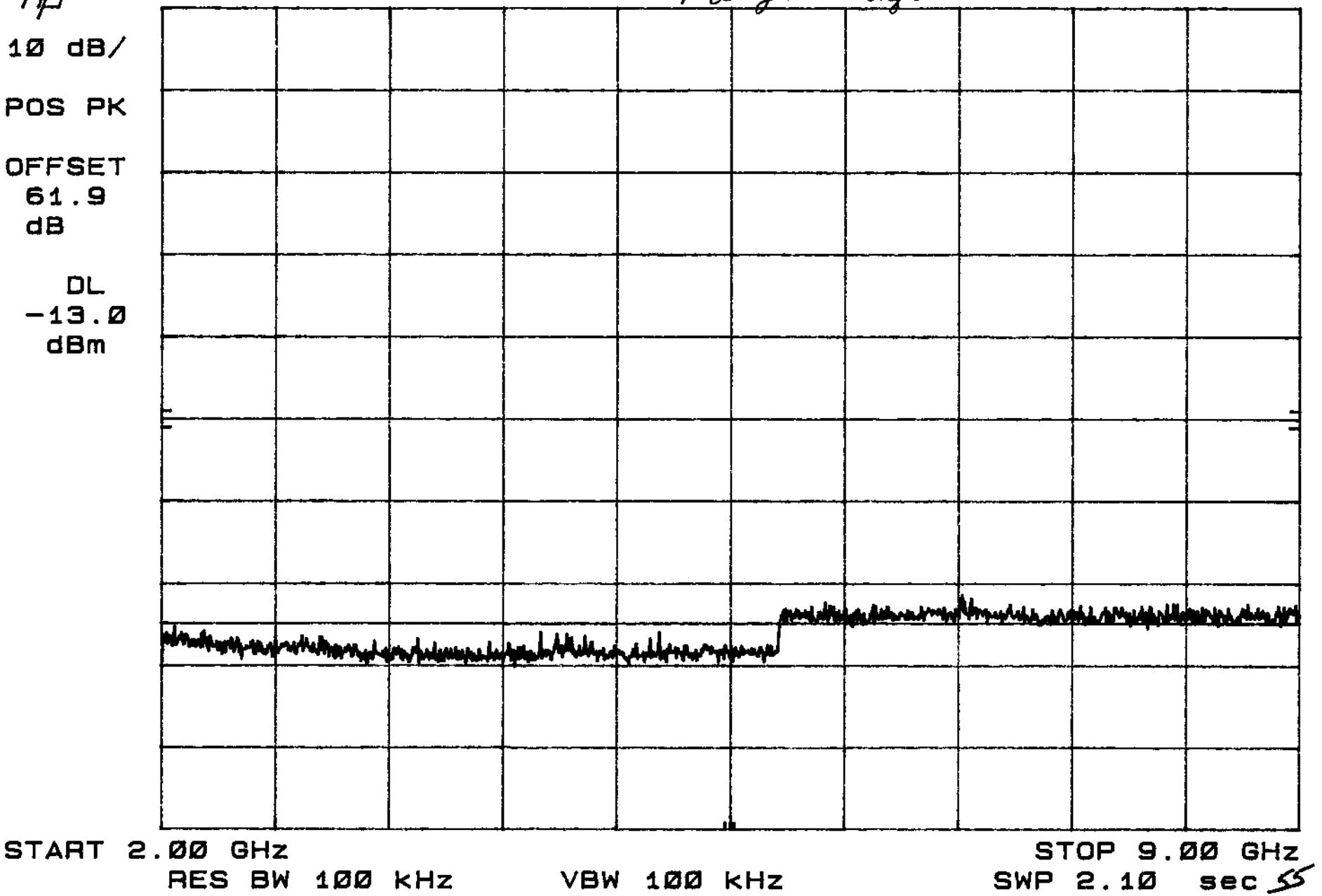
53

2/2/99 S9046 AMPS Voice
Powerwave · RSS-131, 6.6 f_1 = 869 MHz SG1 = -7.08 dBm
100 W configuration spurious f_2 = 894 MHz SG2 = -6.66 dBm
Mary Washington

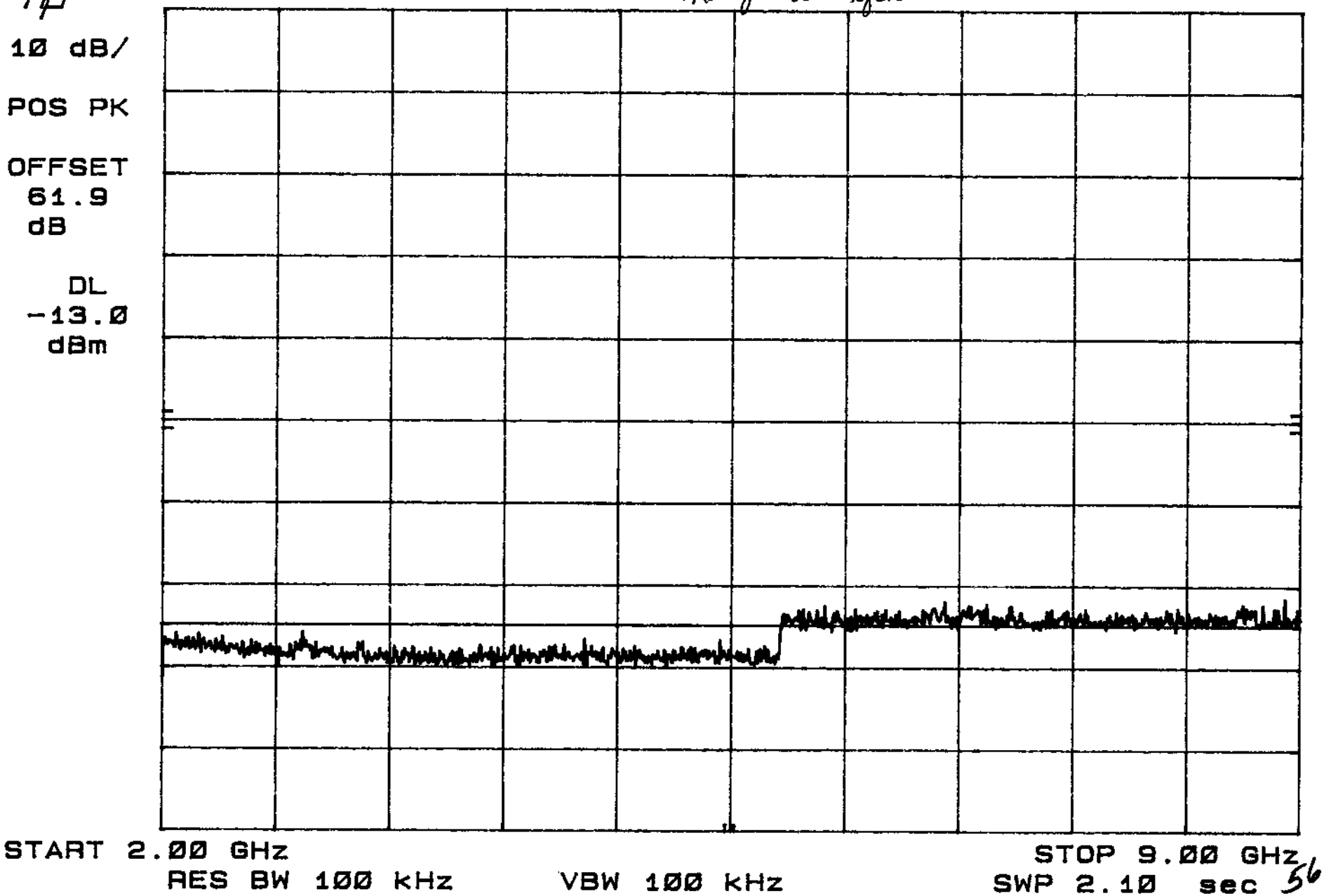


54

2/2/99 S9046 AMPS Voice Input to spectrum analyzer
Powerwave RSS-131, 6/6 f_1 = 869 MHz SG1 = -7.08 dBm
100 W Configuration Spurious f_2 = 894 MHz SG2 = -6.66 dBm
Mary Washington



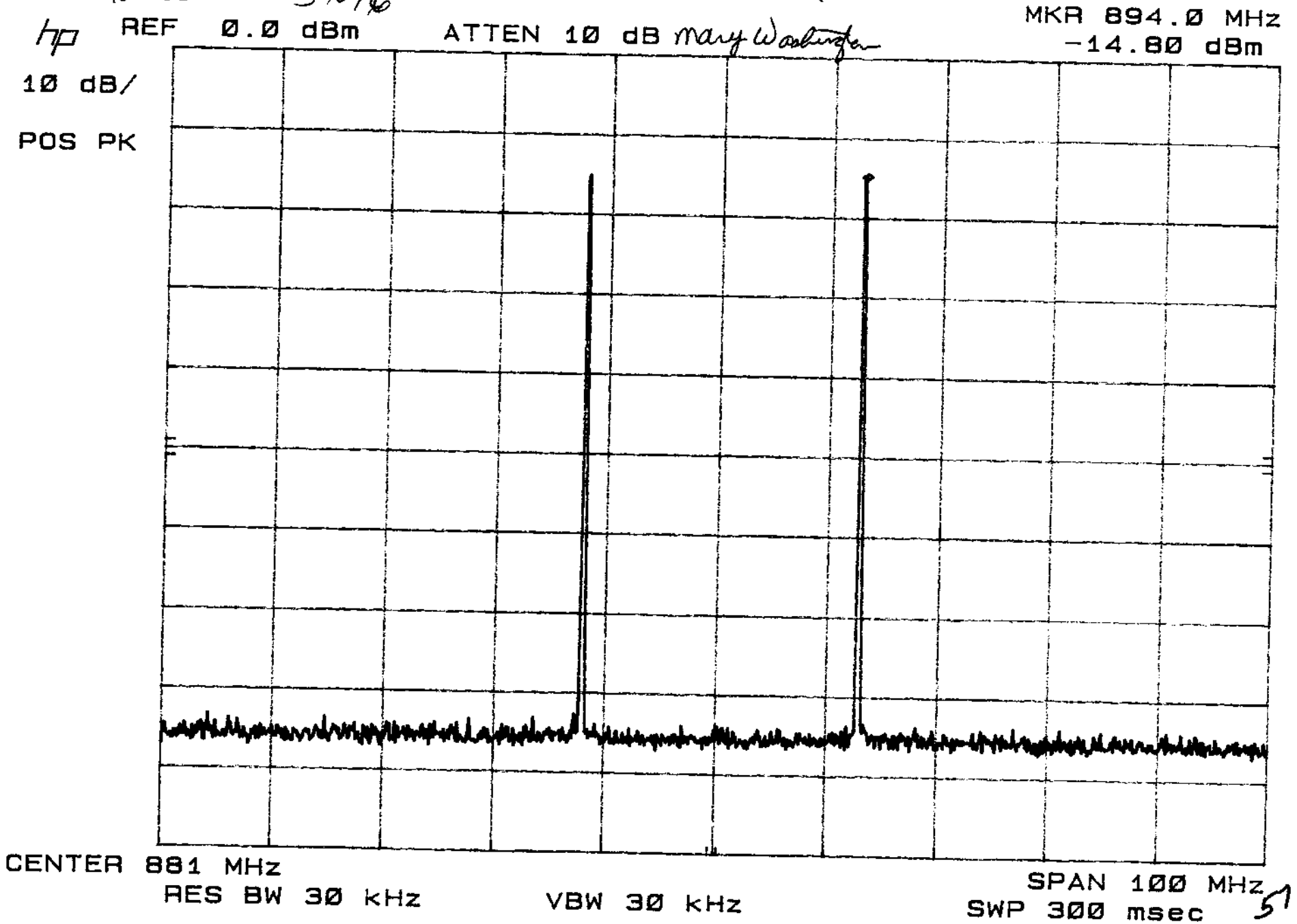
2/2/99 S9046 No input to spectrum analyzer
Powermare
100 W Configuration Spurious RSS-131, 6.6
Mary Washington



2/4/99
Powerwave
100 W

Input Plot
AMPS Voice
S9096

f_1 = 869 MHz SG1 = -7.08 dBm
f_2 = 894 MHz SG2 = -6.66 dBm

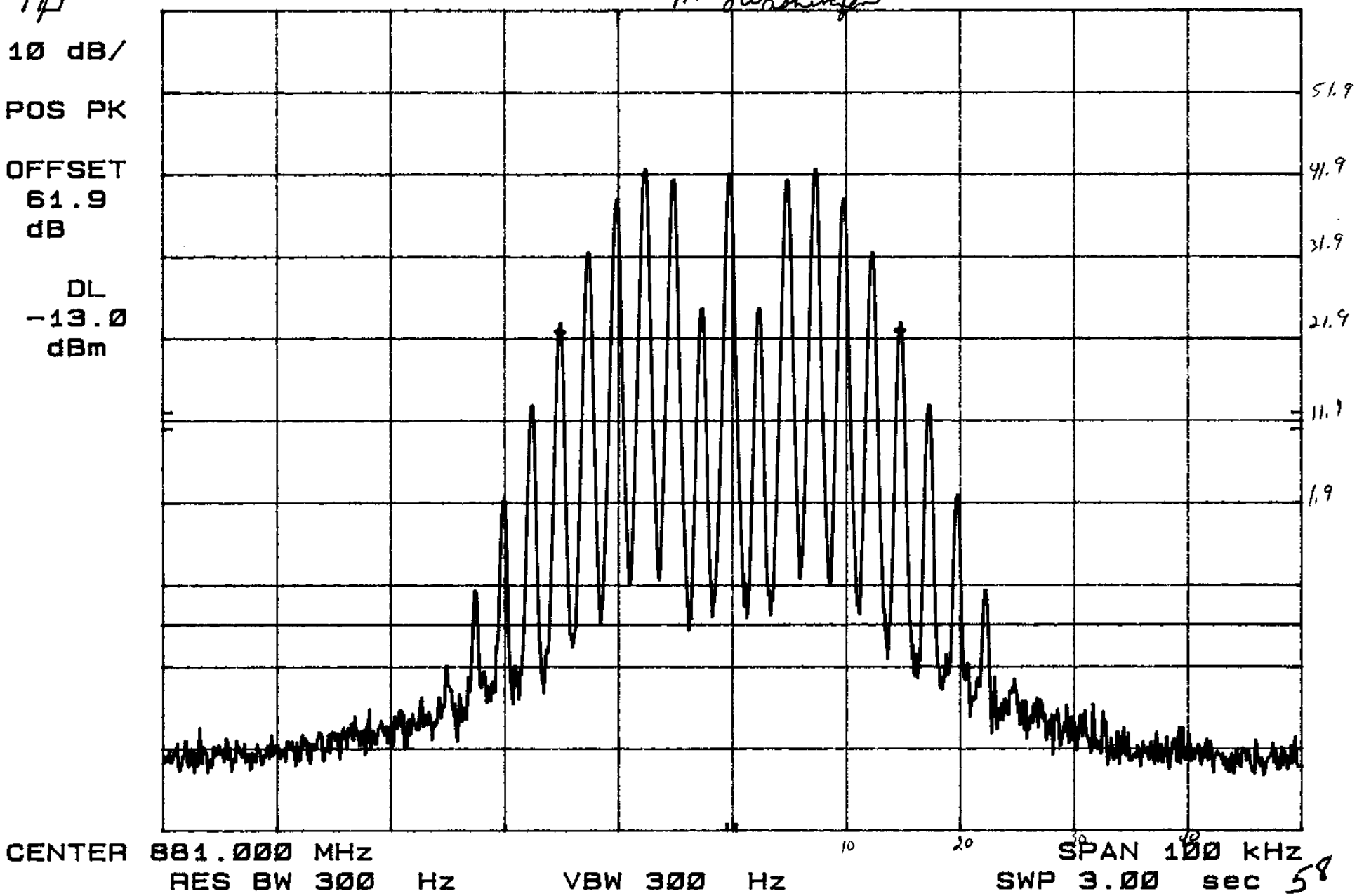


2/2/99
Powerwave
100 W configuration

S9046
RSS-131, Sect. 6.2
2.9 & 22.917

AMPS VOICE
SG7 = -3.94 dBm
f = 881 MHz

Mary Washington



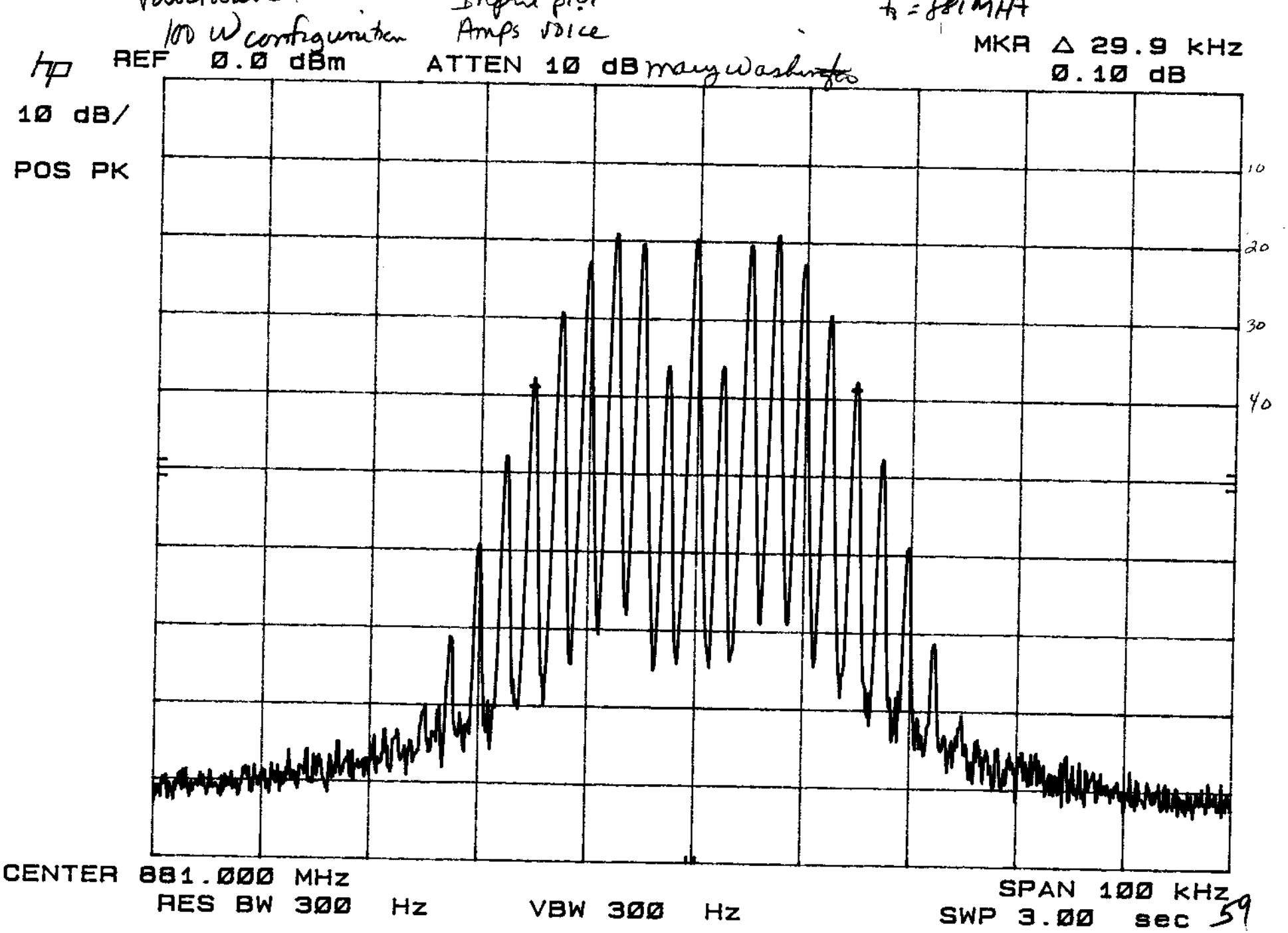
58

2/2/99
Powerwave
100 W configuration

S9046
Input plot
Amps voice

S9046

SG1 = -3.94 dBm
f_1 = 881 MHz



2/4/99
Antenna
90 W

S9046
RSS-131, 6.2
2.9894 22917

AMPS Data

fo = 881 m Hz
S6 = 2.16 dBm

MKR Δ 40.0 kHz
0.00 dB

hp

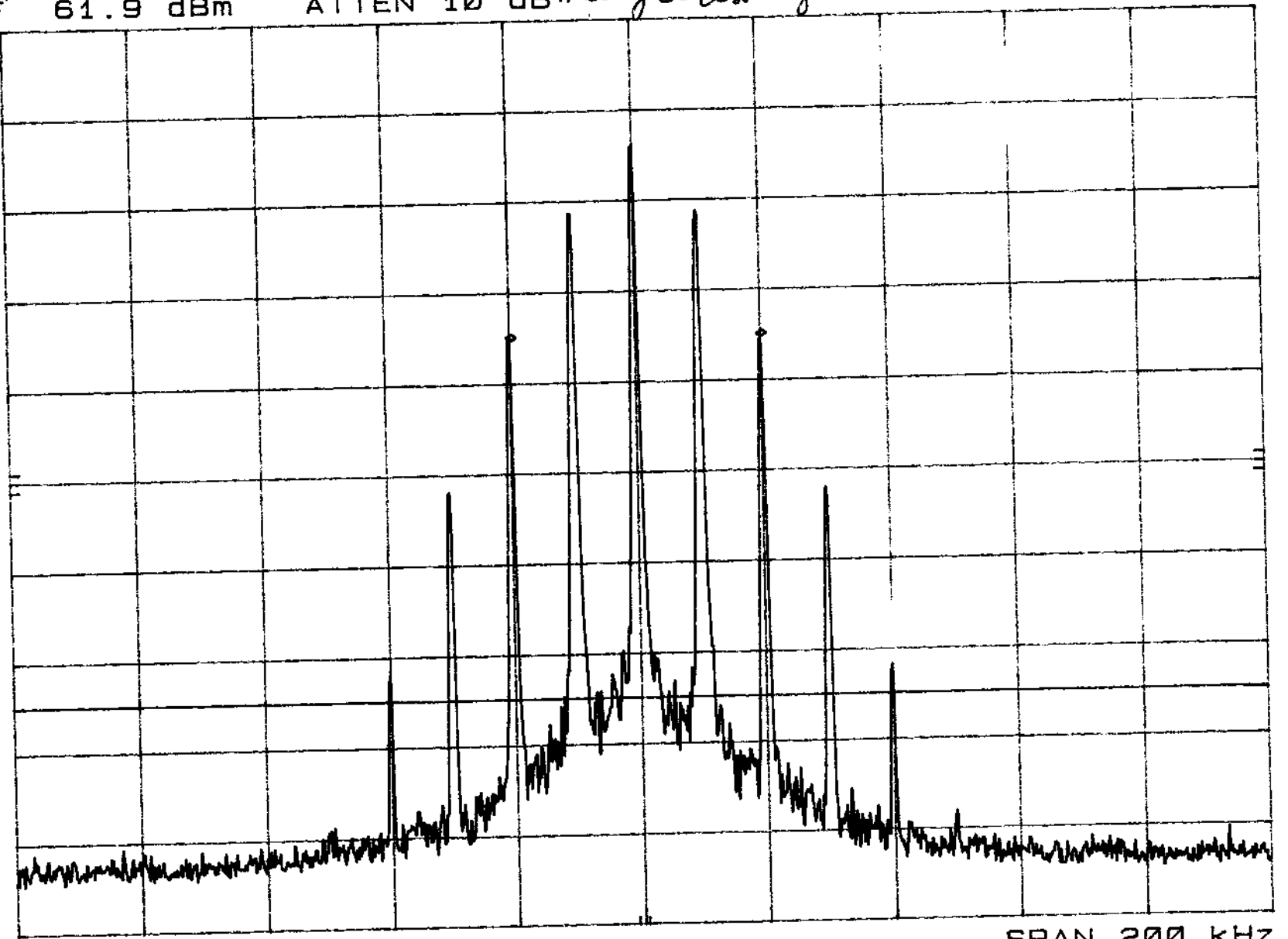
REF 61.9 dBm ATTEN 10 dB mary Washington

10 dB/

POS PK

OFFSET
61.9
dB

DL
-13.0
dBm



CENTER 881.000 MHz
RES BW 300 Hz

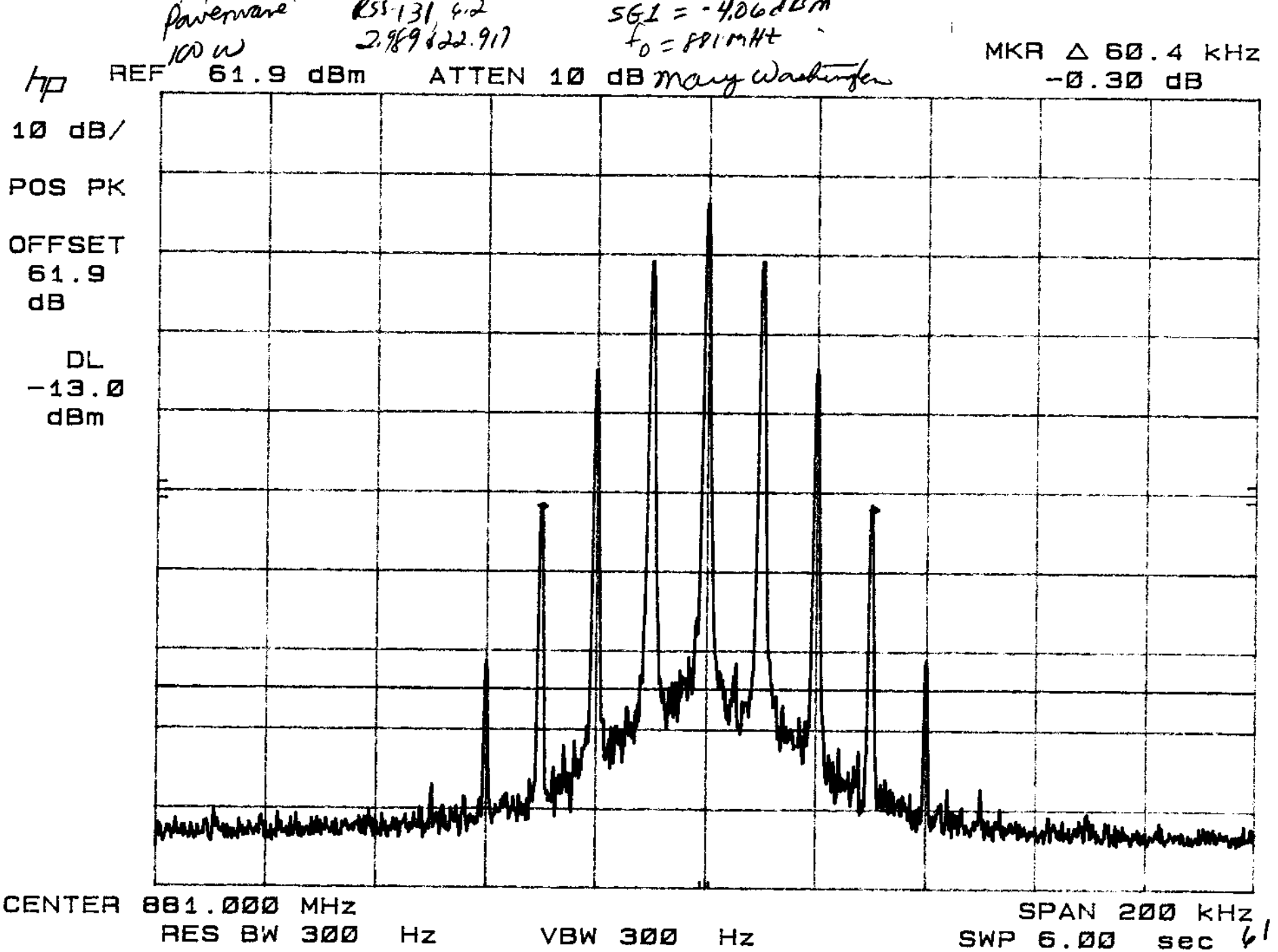
VBW 300 Hz

SPAN 200 kHz
SWP 6.00 sec 60

2/4/99
Powerware
100 W

S9046
RSS-131, 4.2
2.989 & 22.917

AMPS Data
SG1 = -4.06 dBm
f_0 = 881 mHt



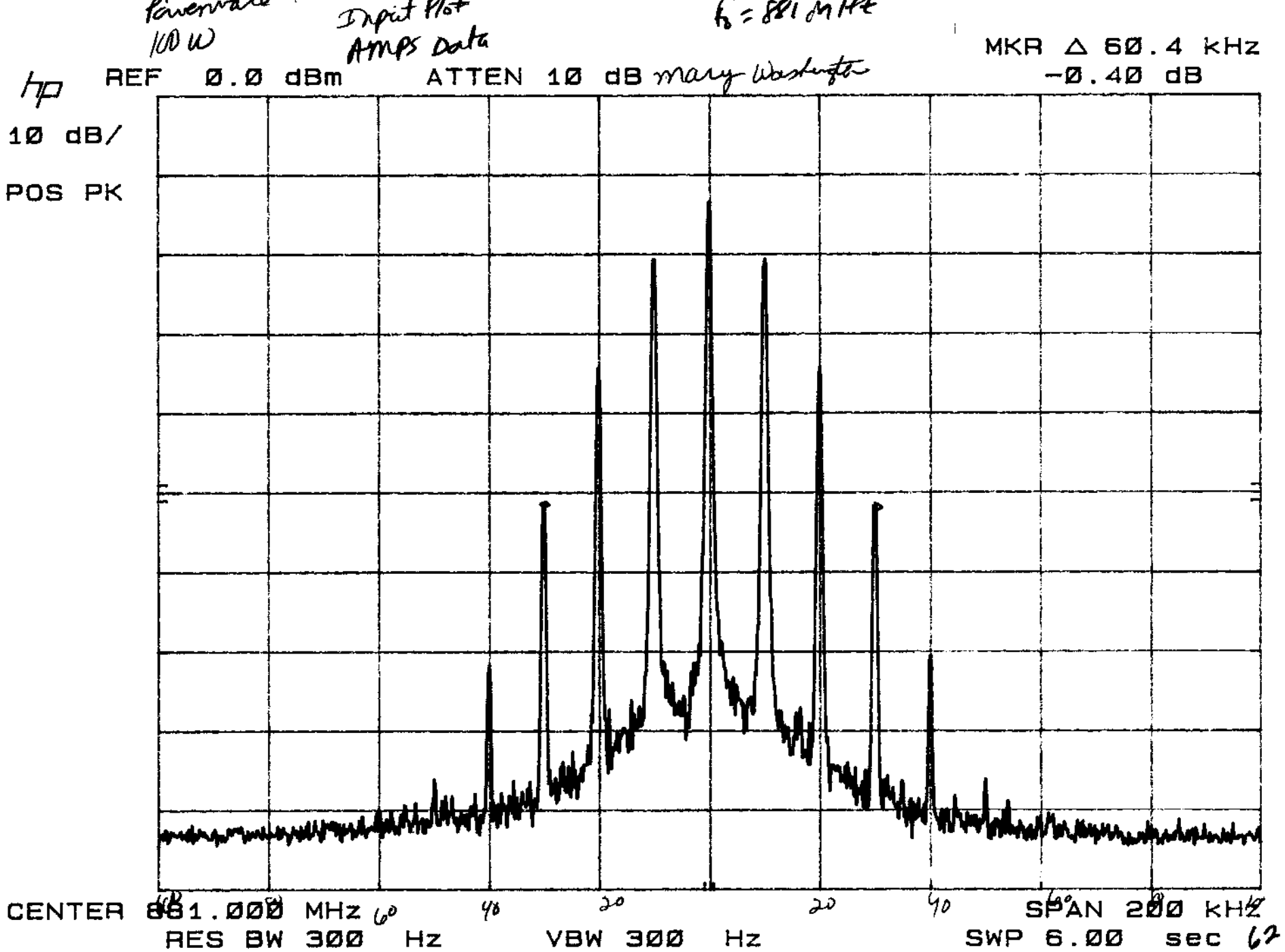
61

2/4/99
Powerware
100 W

S9046
Input Plot
AMPS Data

SGI = -4.06 dBm
f_0 = 881 MHz

Mary Washington

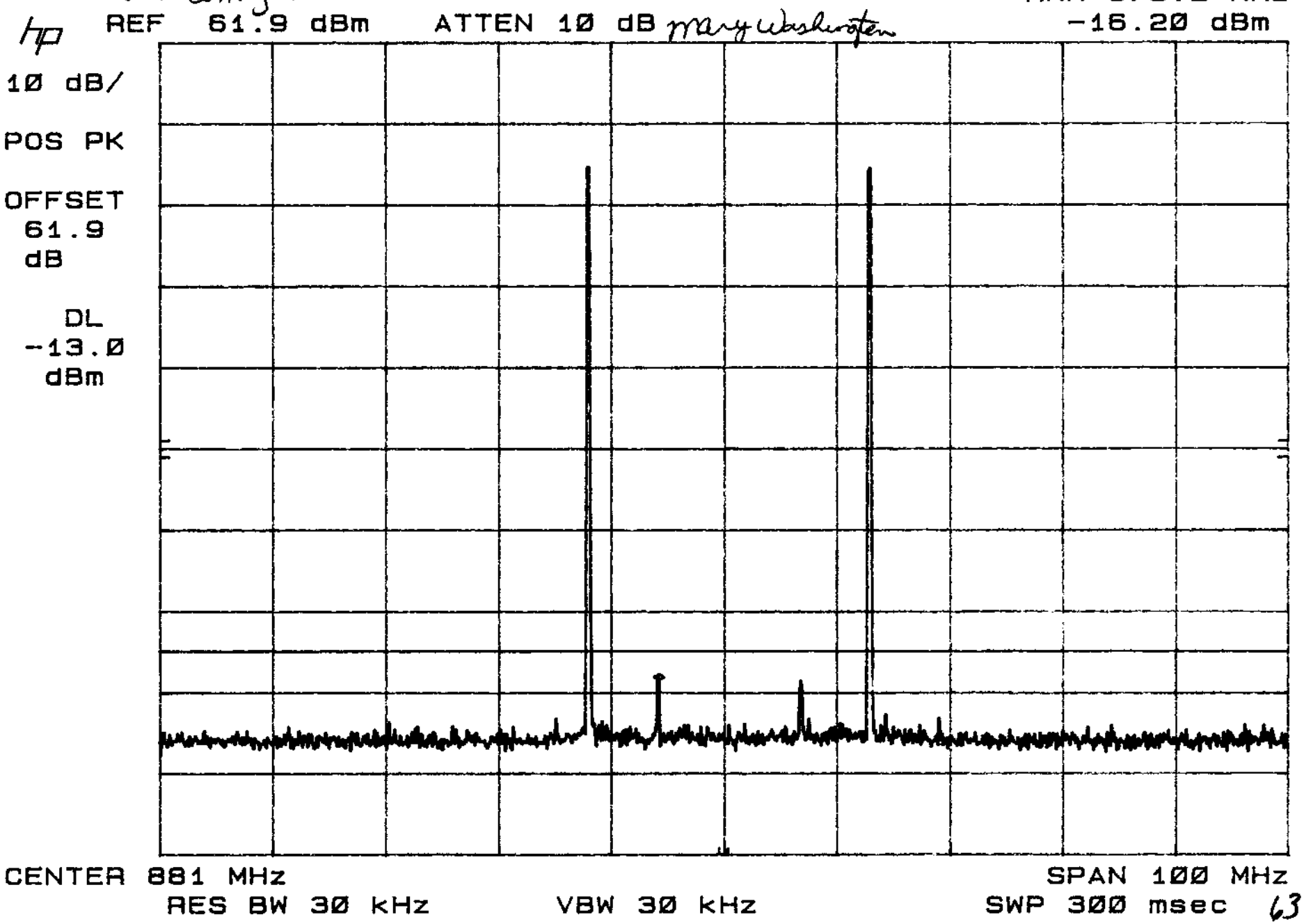


2/4/99
Powerwave
100 W Configuration

S9046
Intermodulation
AMPS Data

f_1 = 869 MHz
f_2 = 894 MHz

SG1 = -7.16 dBm
SG2 = -6.66 dBm

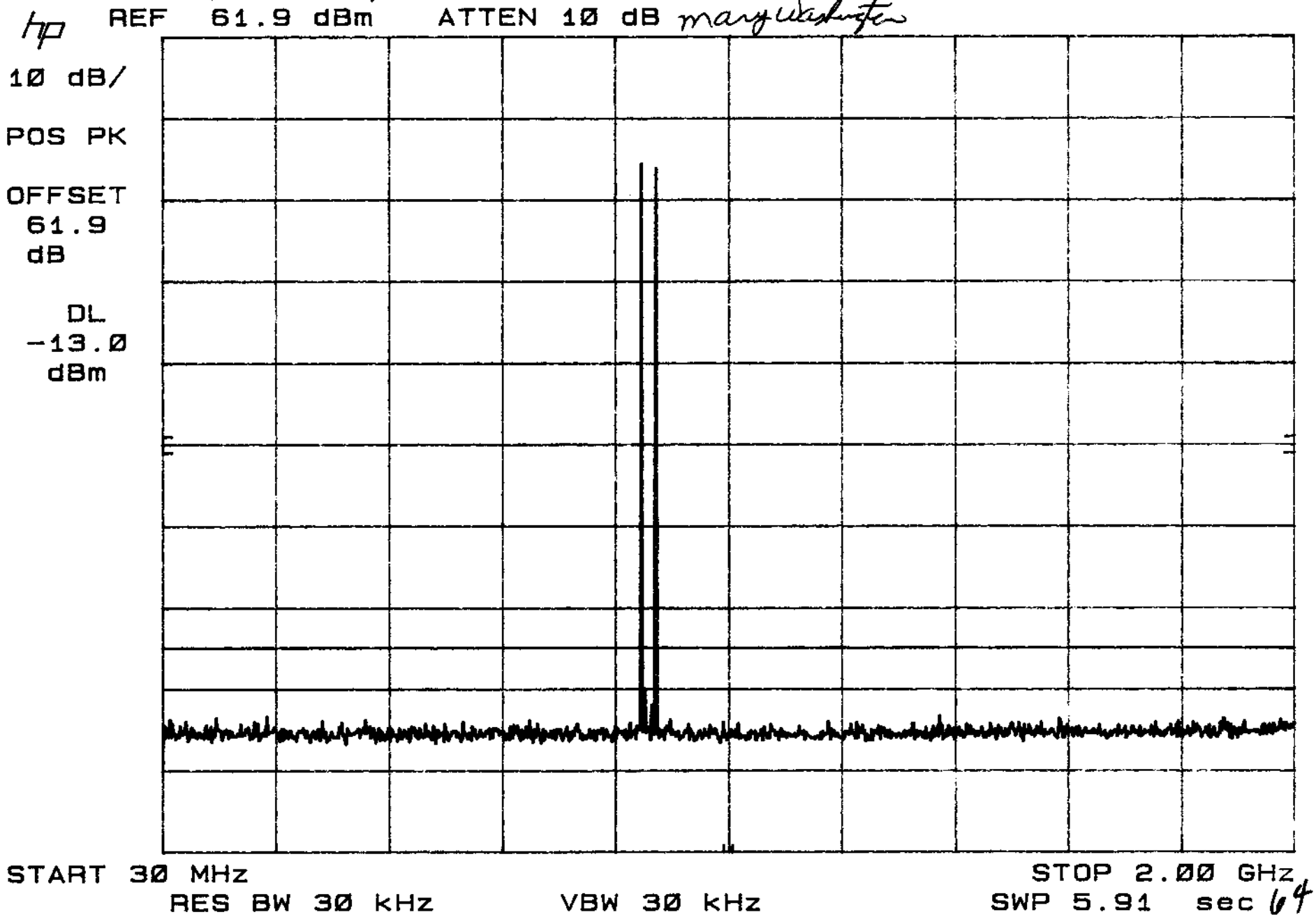


2/4/99
Powerwave
100 W configuration

S9046
2.991 & 22.917
Spurious Emissions

AMPS Data
f_1 = 869 MHz
f_2 = 894 MHz

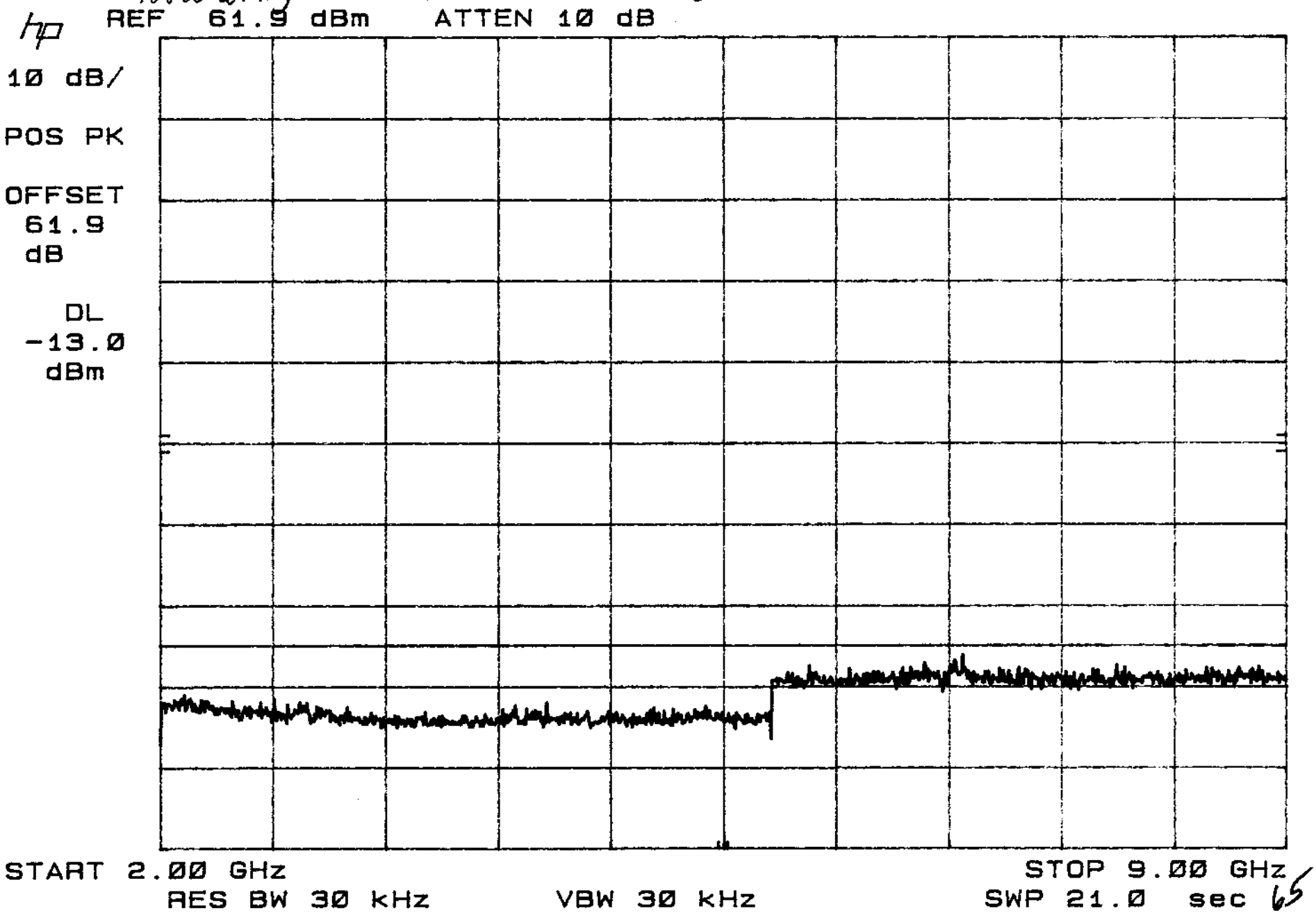
SG1 = -7.16 dBm
SG2 = -6.82 dBm



64

2/4/99 SG046
Powerwave 2.991 & 22.917
100 W configuration Spurious

AMPS Data
f_1 = 869 MHz SG1 = -7.16 dBm
f_2 = 894 MHz SG2 = -6.82 dBm

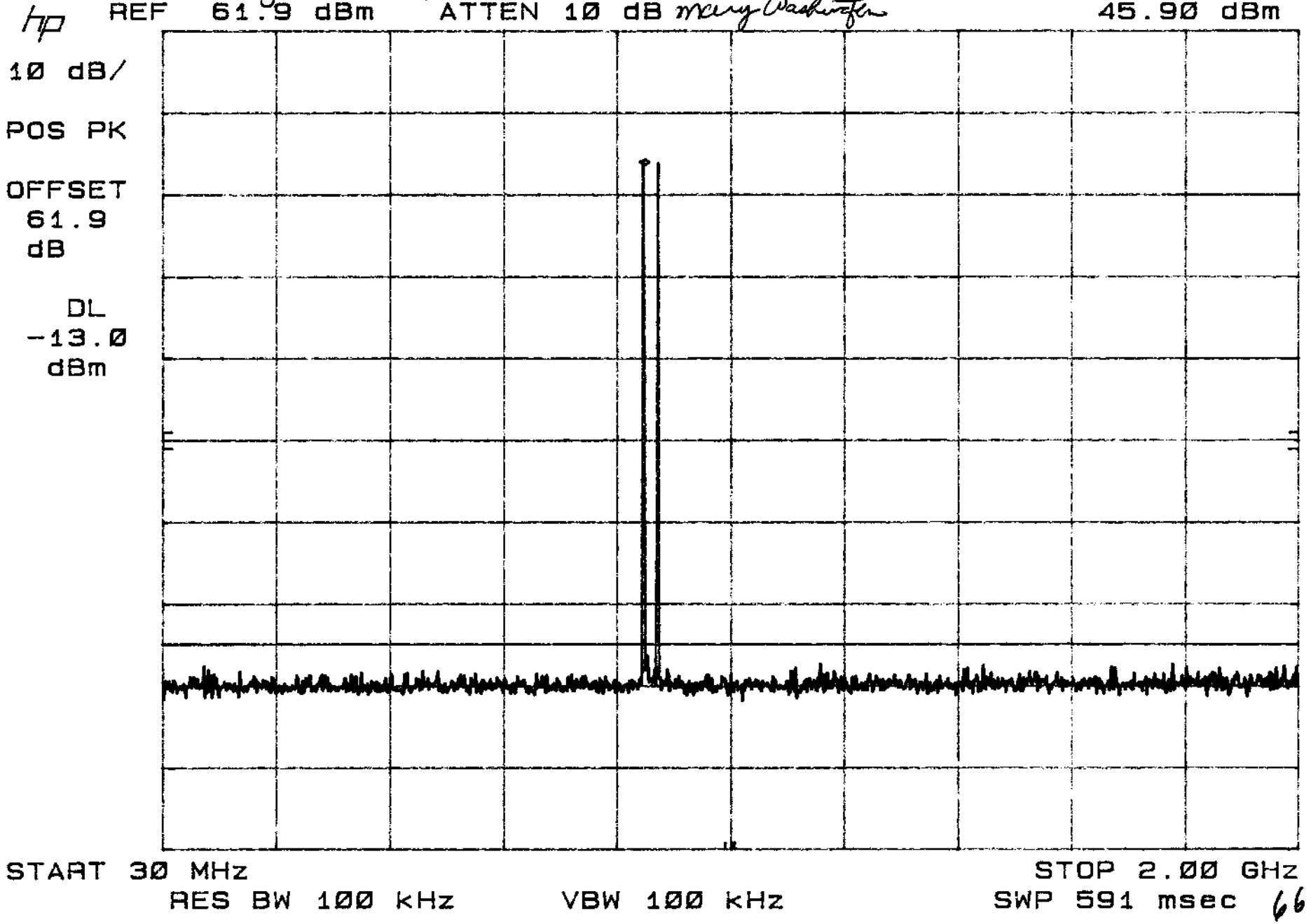


2/4/99
Powerwave
100W configuration

59046
RSS-131, Section 6.6
Spurious

AMPS Data
f_1 = 869 MHz
f_2 = 894 MHz

SG1 = -7.16 dBm
SG2 = -6.80 dBm

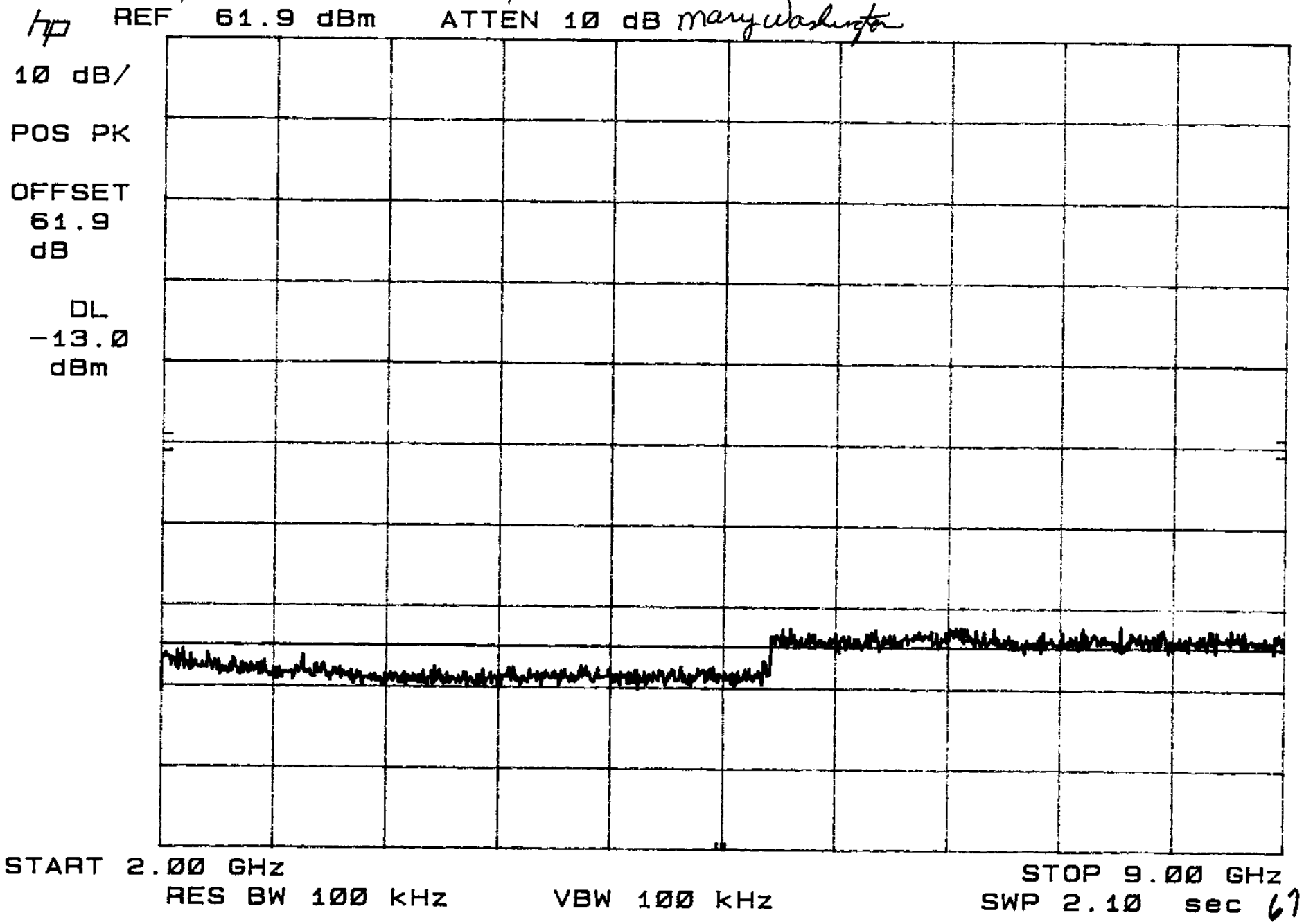


2/4/99
Powerwave
100 W

S9046
Spurious
RSS-131, 6.6

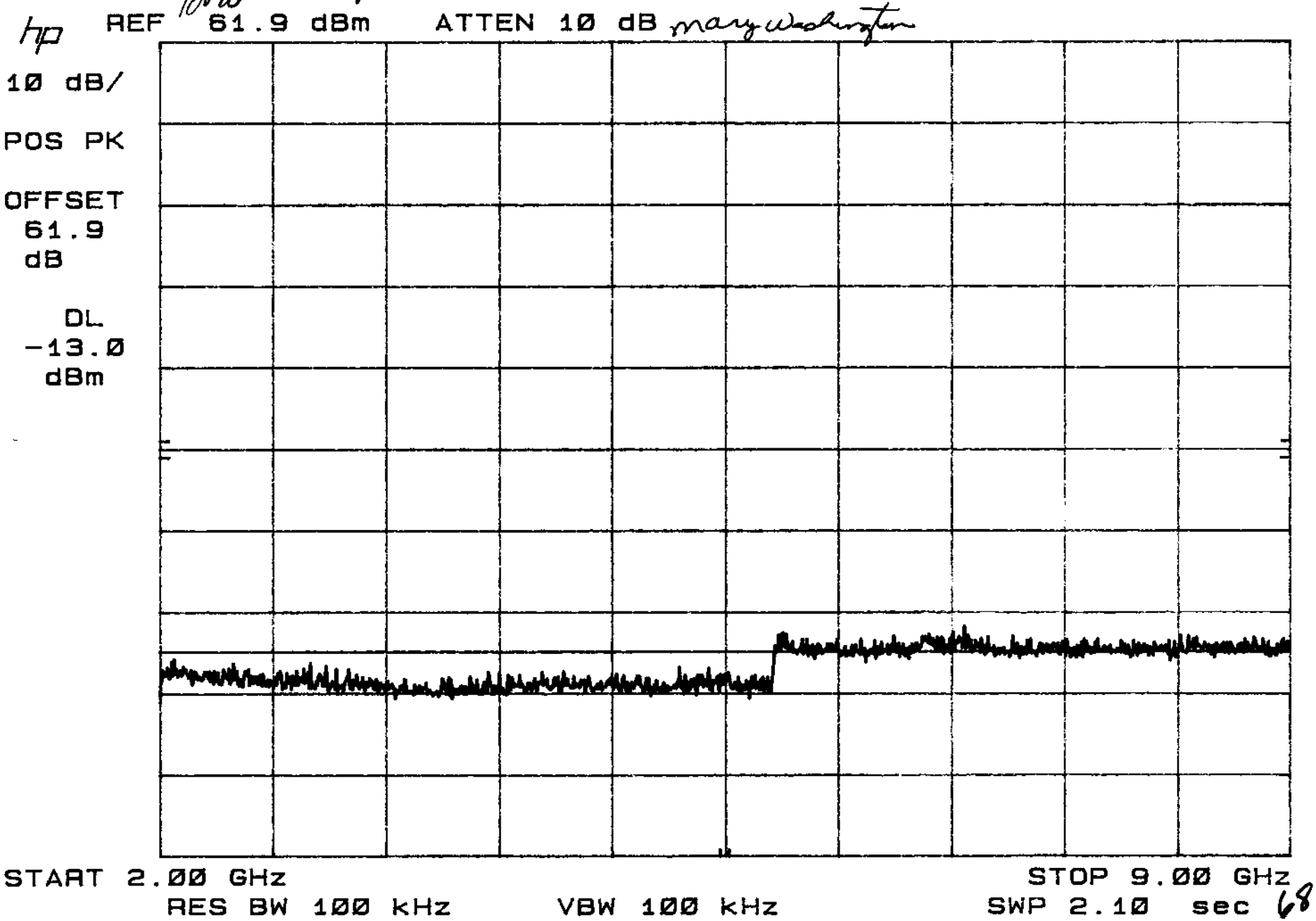
Input to spectrum analyzer
f_1 = 869 MHz f_2 = 894 MHz
Amps Data -

SG1 = -7.16 dBm
SG2 = -6.8 dBm

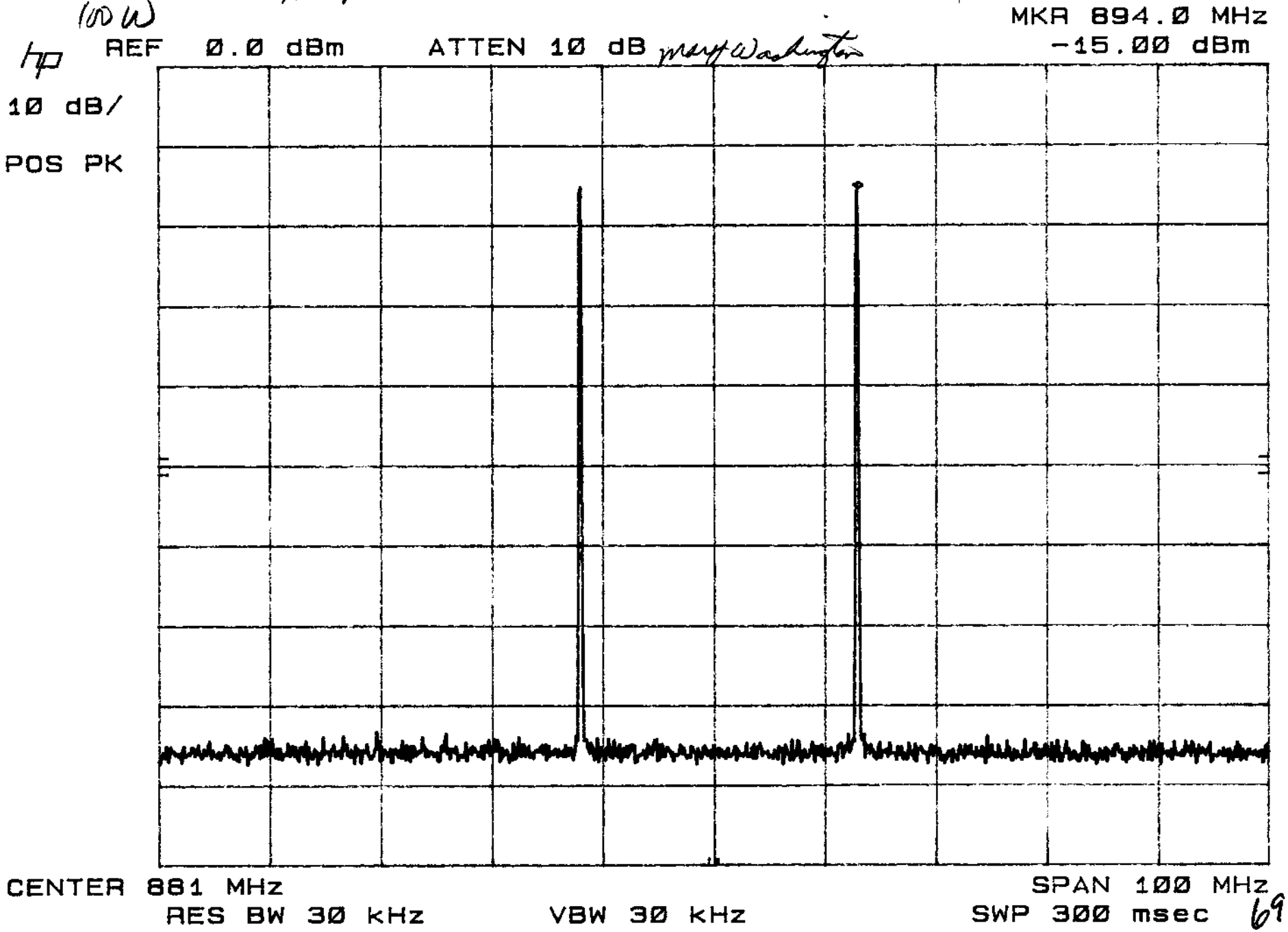


Mary Washington

2/4/99 59046 ND input to spectrum analyzer
Powerman spurious RSS-131, 6.6
10W



2/4/99 Input Plot f_1: 869 mHz f_2 = 894 mHz
Powerwave Amps Data SG1: -7.16 dBm SG2: -6.8 dBm
100 W



2/9/99
Powerwave
90W

59046
RSS-131, 6.2
2.989 + 22.917

f_o = 881 mHz
SG1 = 2.28 dBm
CDMA

Occupied Bandwidth

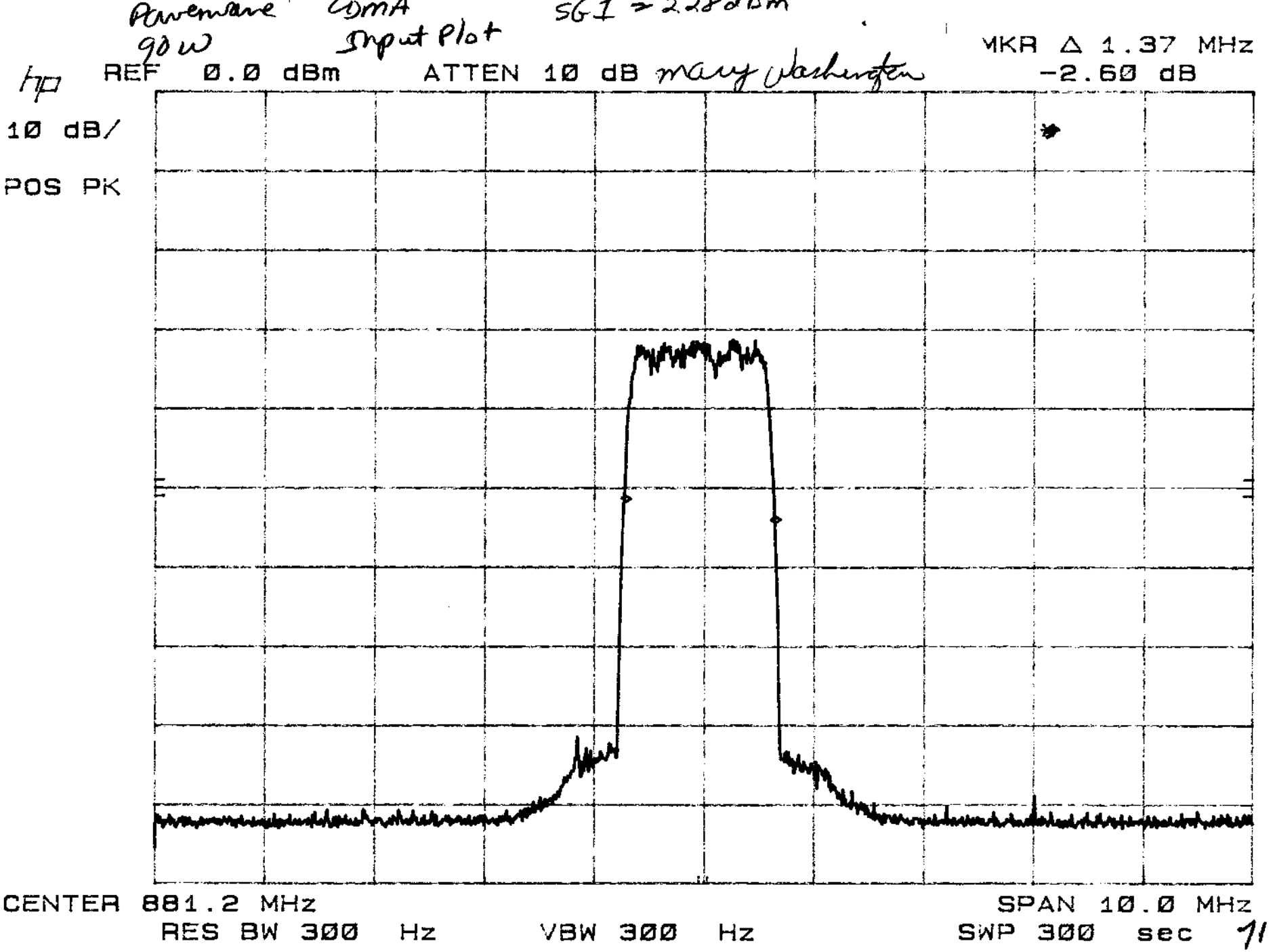
MKR Δ 1.37 MHz
0.40 dB

hp REF 61.9 dBm ATTEN 10 dB mary washington

CENTER 881.0 MHz
SPAN 10.0 MHz
RES BW 300 Hz
VBW 300 Hz
SWP 300 sec

70

2/4/99 5904b f_o = 881 MHz
Powerwave CDMA SG1 = 22.8 dBm
90 W Input Plot



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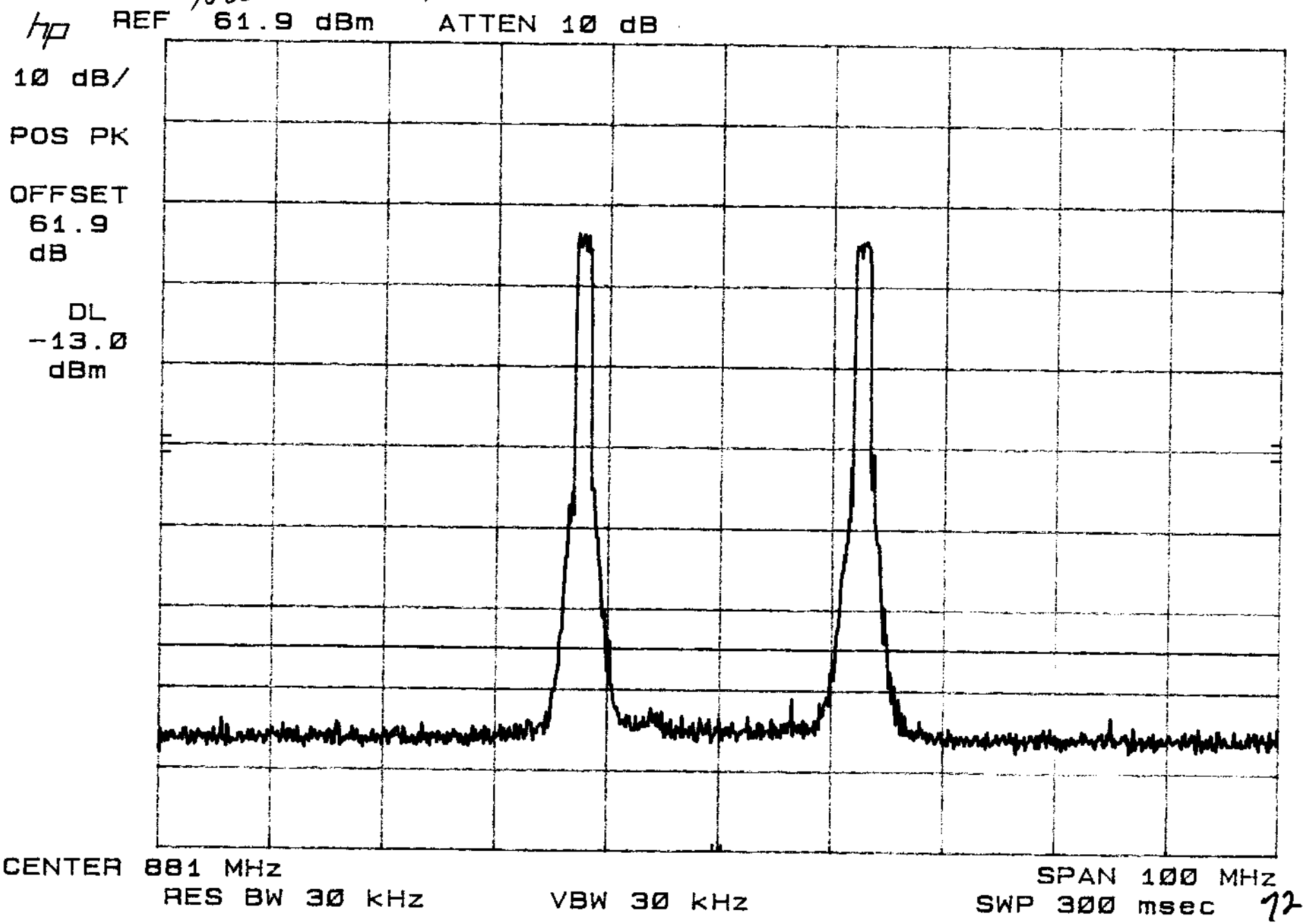
2/4/99
Powerwave
90W

59046
Intermodulation
CDMA

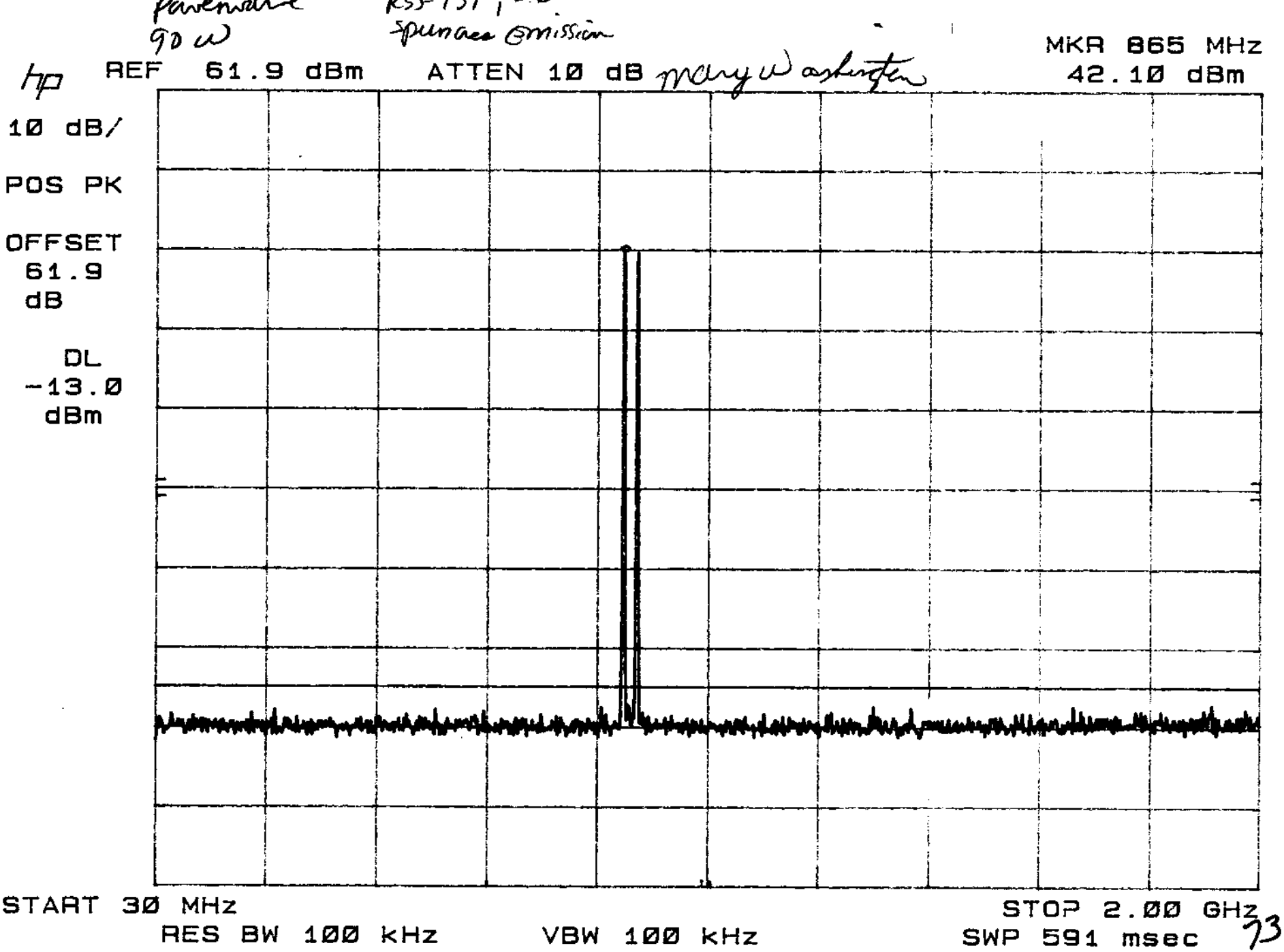
f_1 = 869 MHz f_2 = 894 MHz
SG1 = -0.76 dBm SG2 = -0.4 dBm



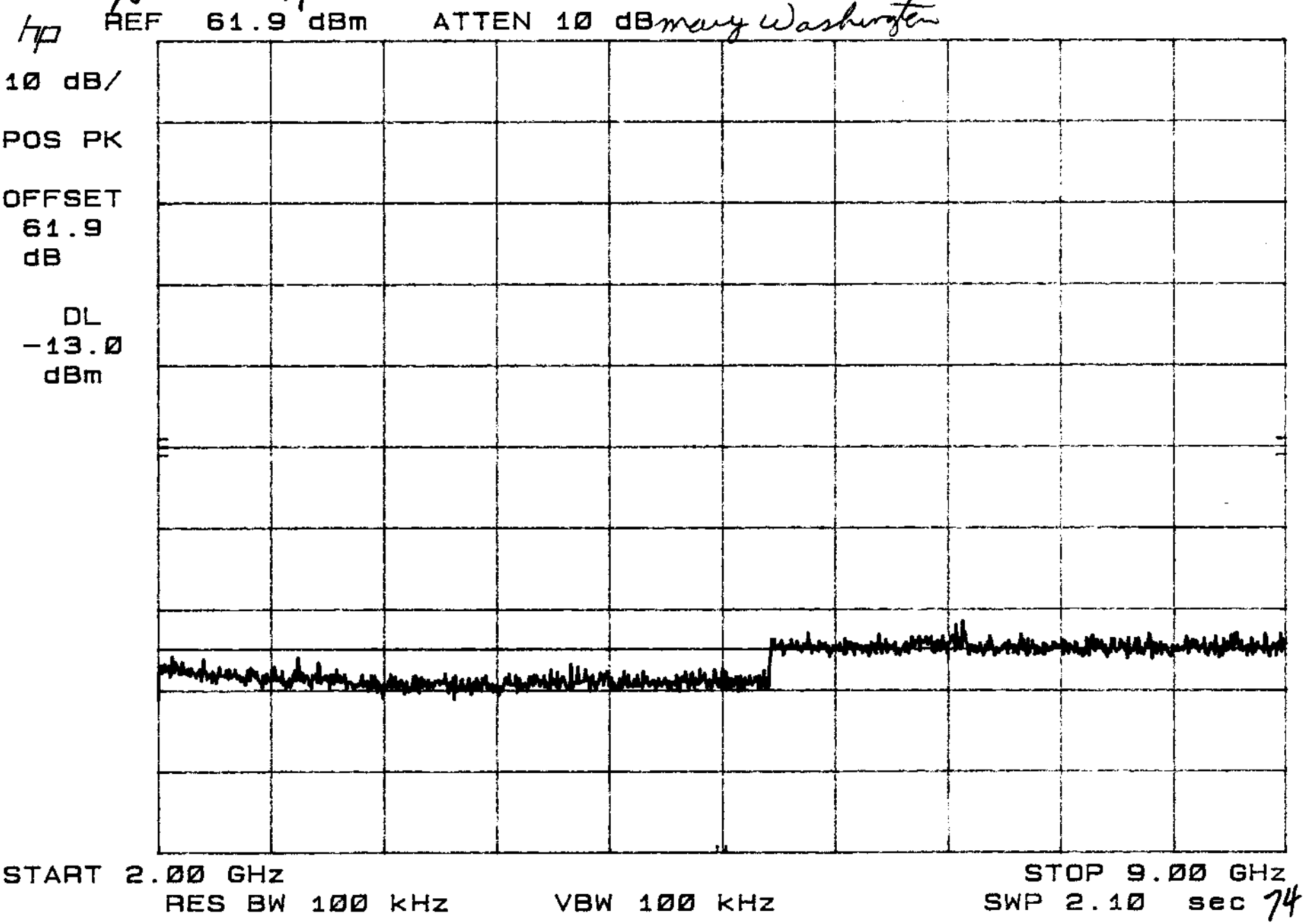
2/4/99
Powerwave
90 W

5904/6
RSS-131, 6.6
Spurious emission

CDMA $f_1 + f_2$ = same as above SG1 + SG2 SG1 = -0.76 SG2 = -0.4



2/4/99 5906 CDMA f_1, f_2, SG1 + SG2 = Same as before SG1 = -0.76
Powerwave 05-131,6.6 Input to spectrum analyzer SG2 = -0.9 dB
90 W spurious emission

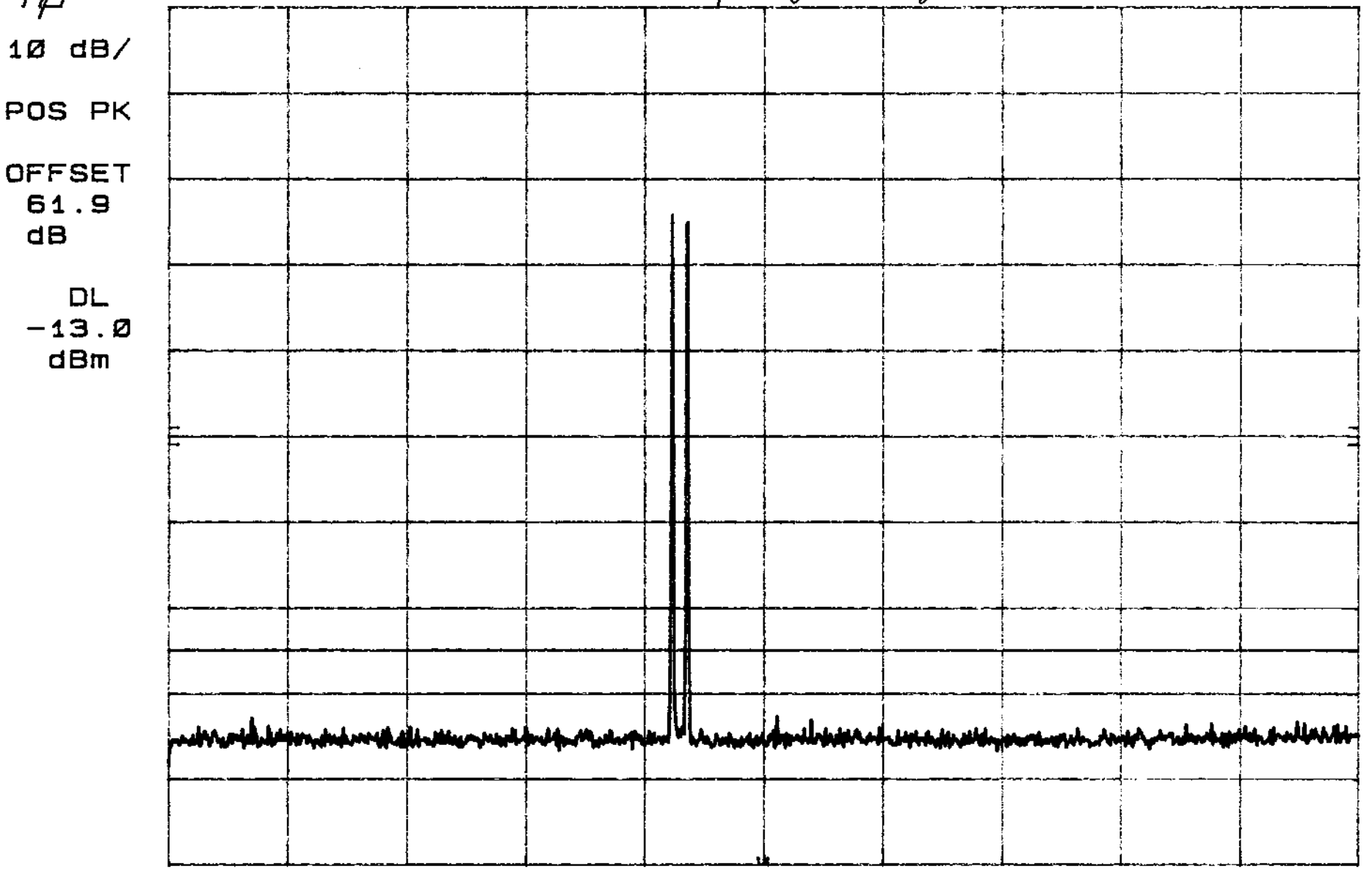


2/4/99 Powerware 90 W

39046 2.991+22.917 spurious

CDMA f_1, f_2 = same
SG1 = -0.76 dBm
SG2 = -0.40 dBm

hp REF 61.9 dBm ATTEN 10 dB marywashington

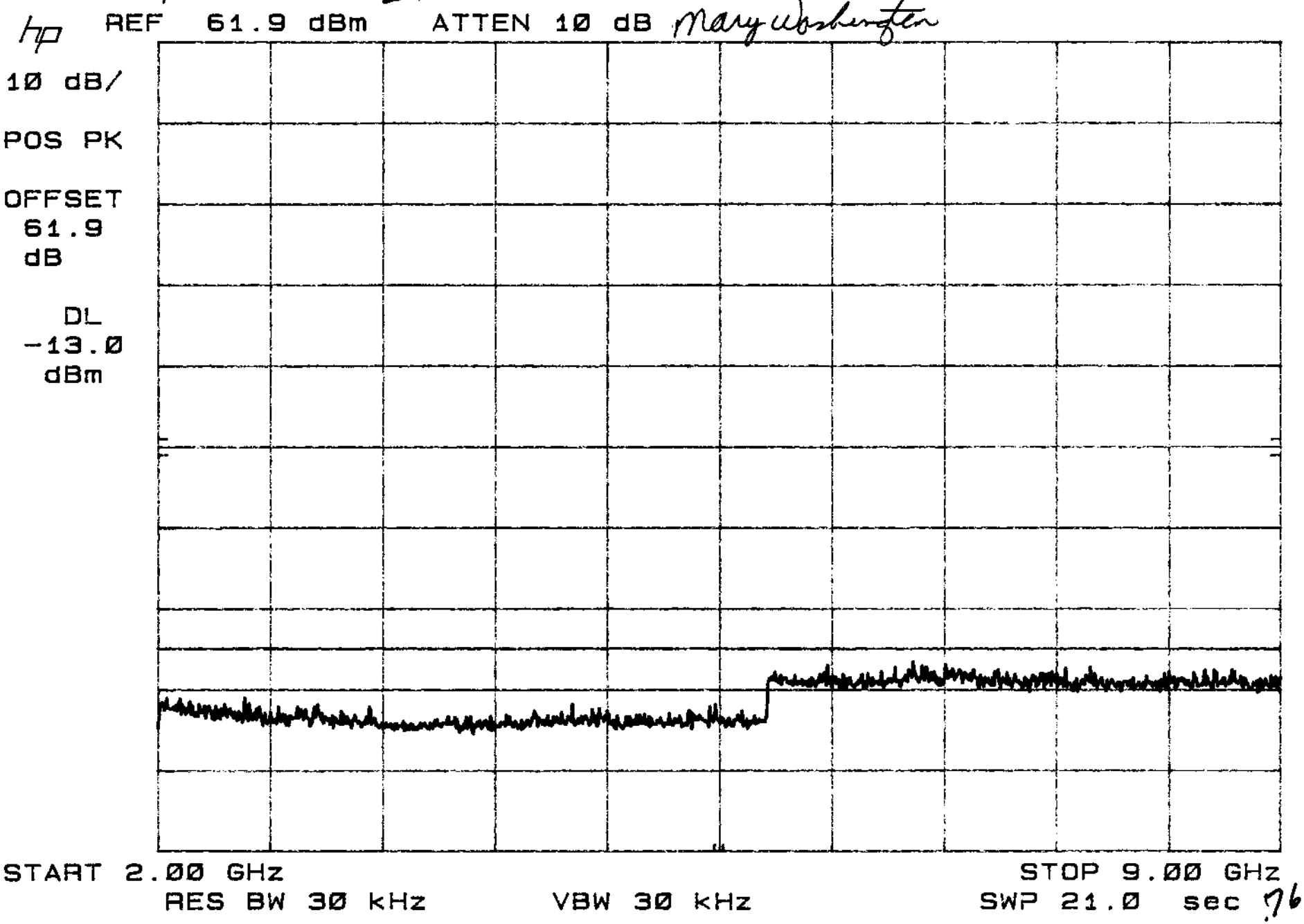


75

2/4/99
Powerwave
90 W

59046
Spurious Emission
2.991 & 22.917

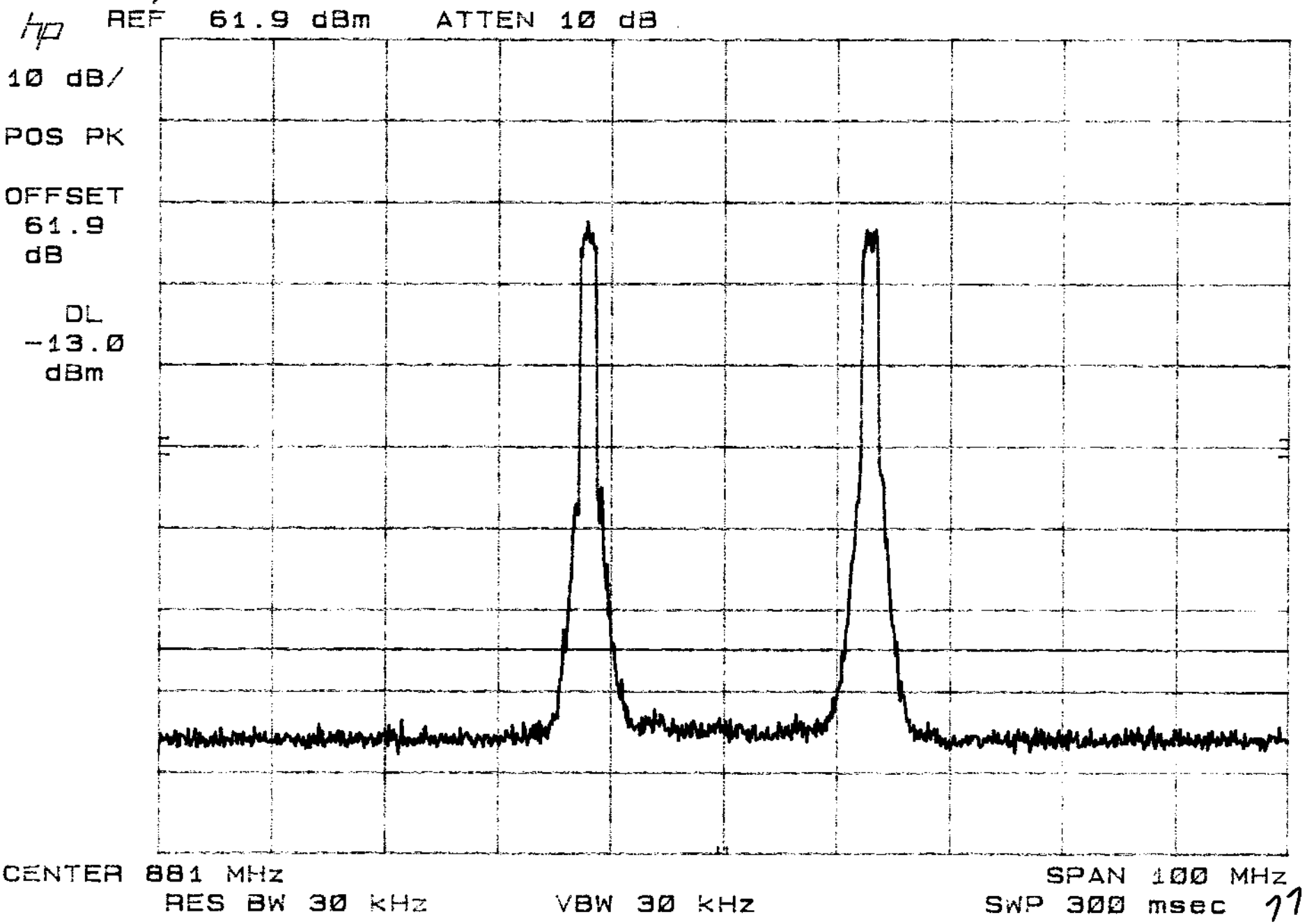
SG1 = -0.76 dBm SG2 = -0.4 dBm
f_1 = 869 MHz f_2 = 894 MHz



76

2/4/99 S904
Powerwave CDMA
90 w Intermodulation

$f_1 = 869$ MHz $f_2 = 894$ MHz
SG1 = -0.96 dBm SG2 = -0.4 dBm

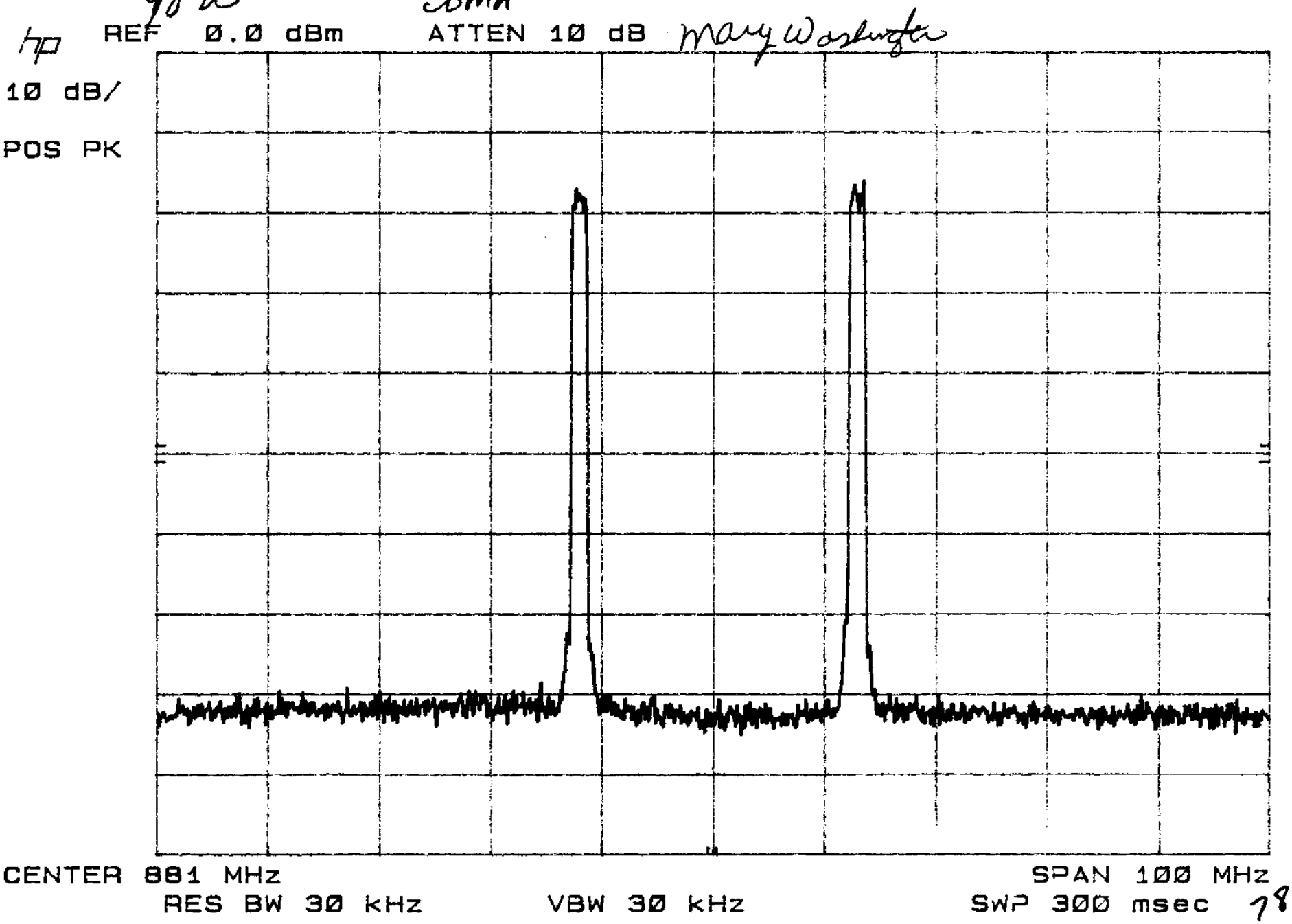


2/4/99 Performance 98 w

59046 Output plot comA

SG1 = -0.76 dBm f_1 = 869 MHz

SG2 = -0.4 dBm f_2 = 879 MHz

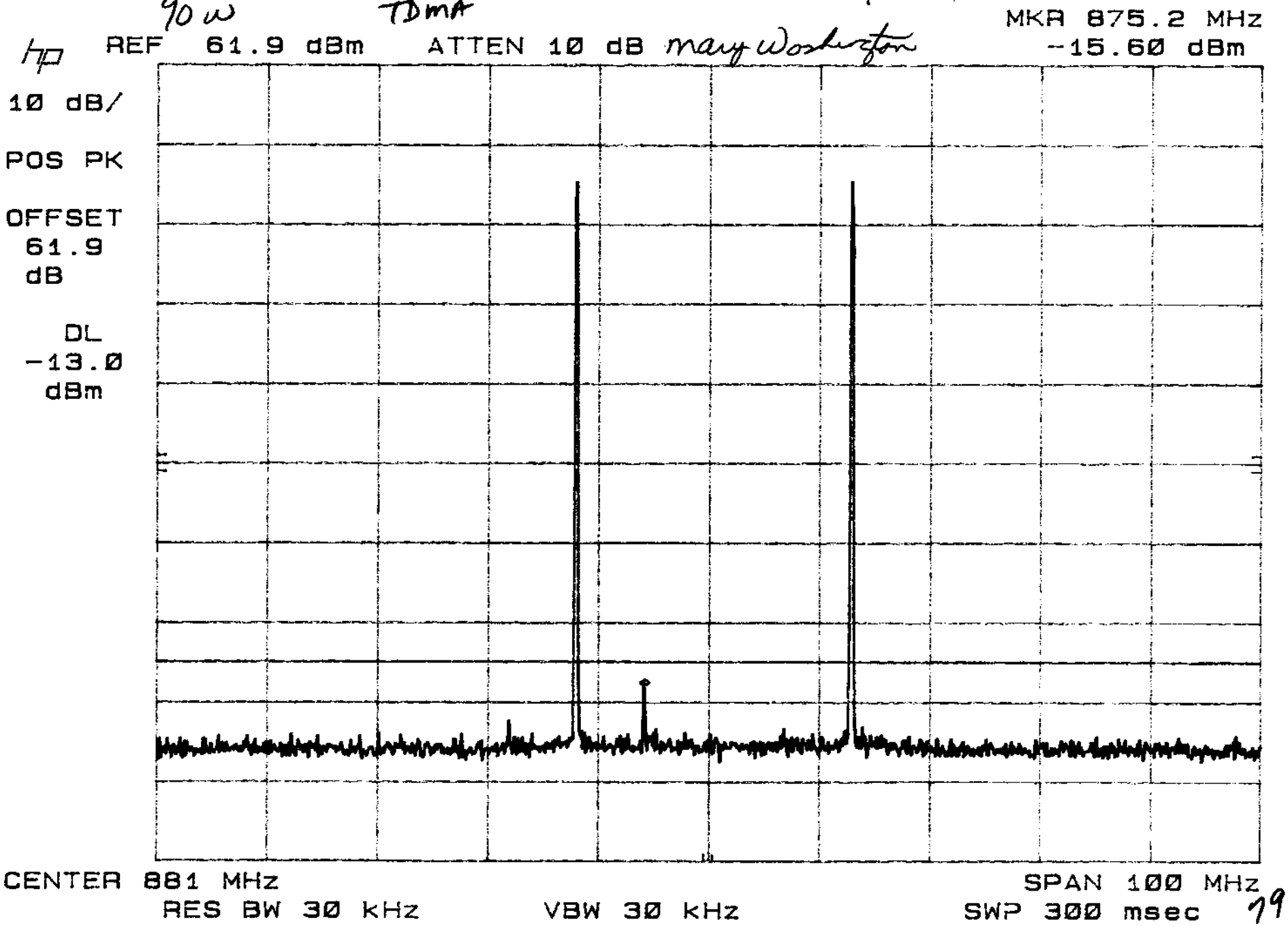


2/4/99 Powerwave 90 W

59046 Intermodulation TDMA

SG1 = -0.82dBm SG2 = -0.38dBm

f_1 = 869 f_2 = 894



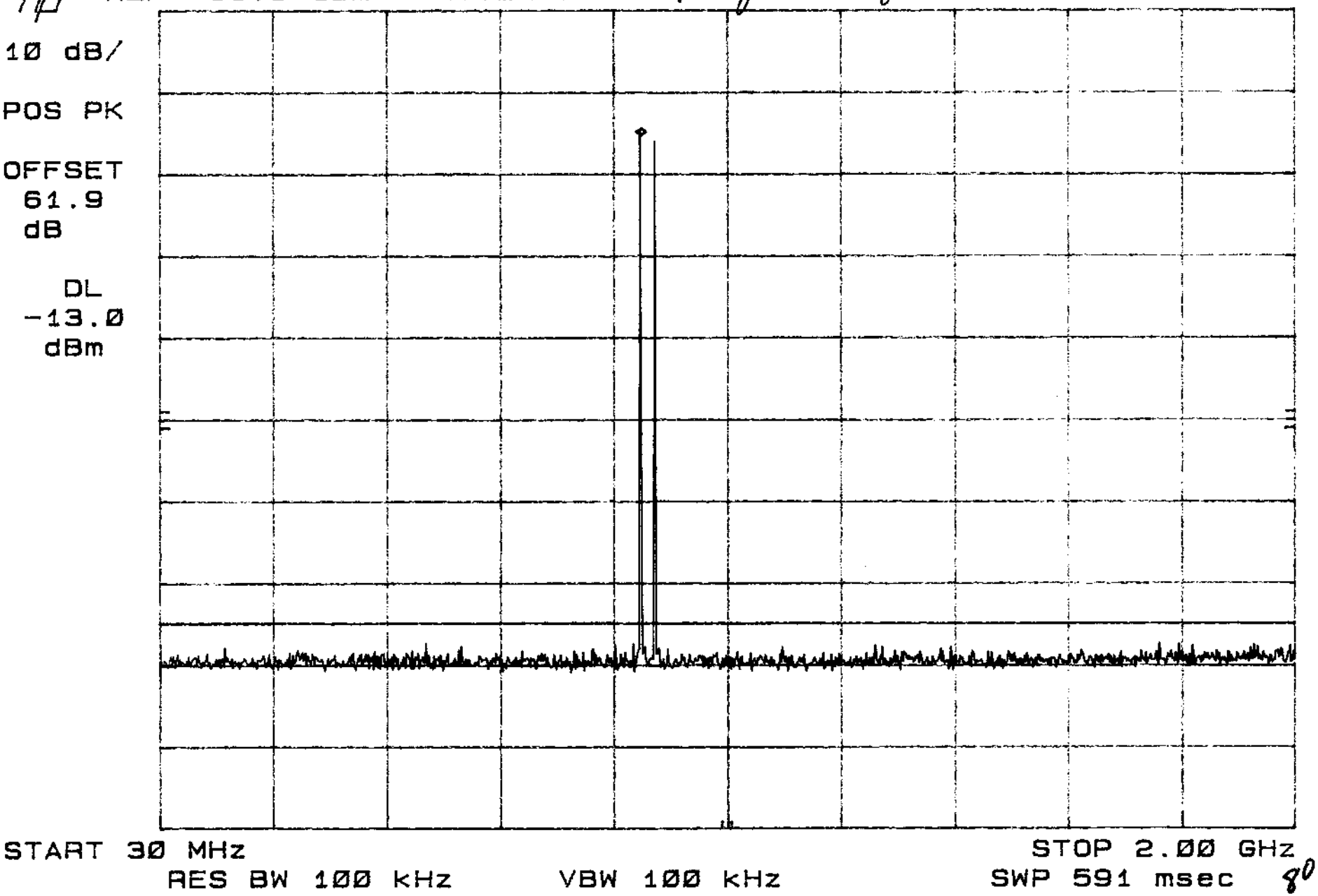
May Washington

2/4/99
Powerware
90 W

59046
RSS-131, 6.6
Spurious Emission

TDMA f_1=869 f_2=894 SG1 = -0.82dBm
SG2 = -0.38dBm

Mary Washington

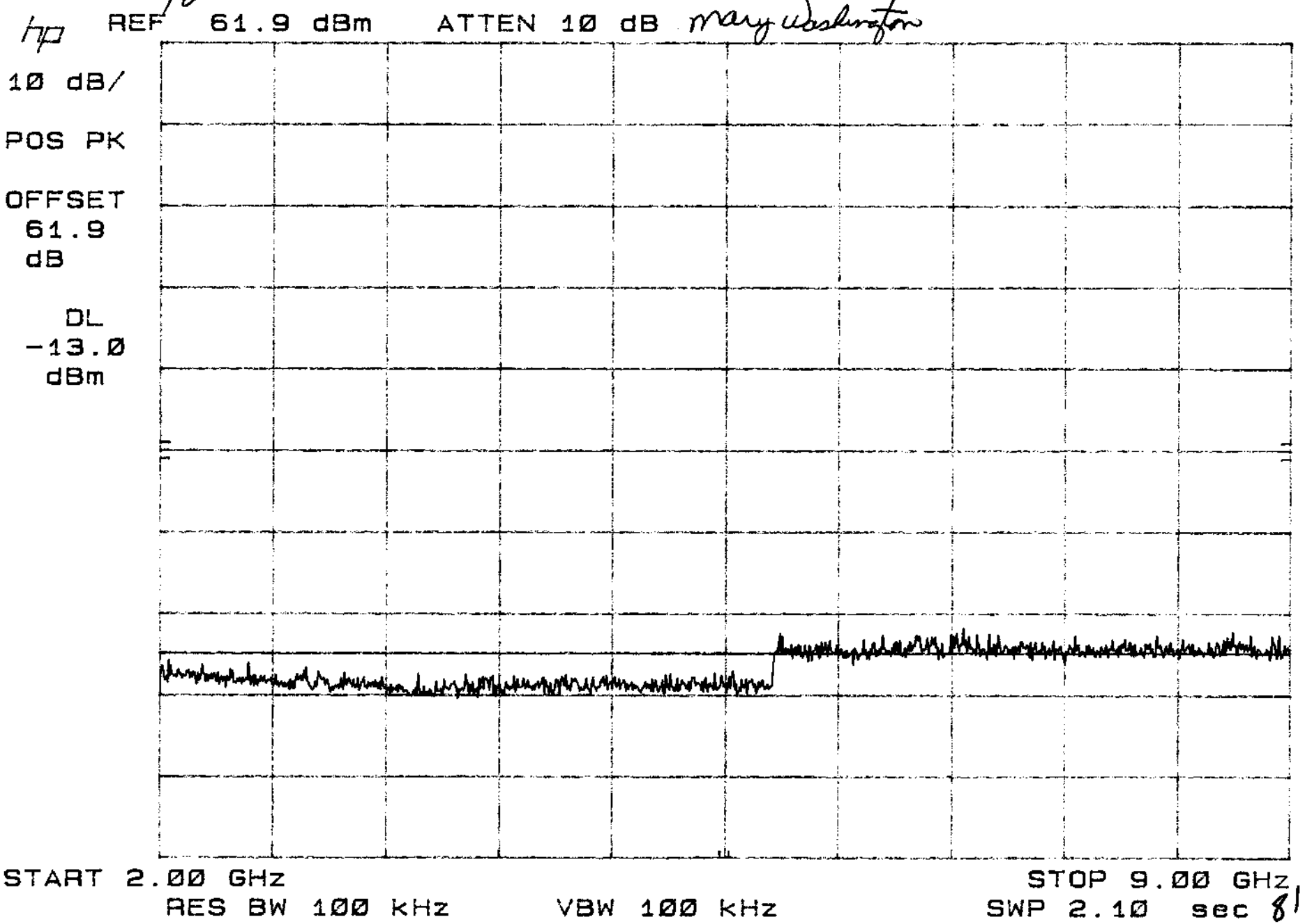


80

2/4/99 Ravenware 9D W

S9046 TDMA RSFI 31, 6.6 f_1=869 f_2=894

SG1 = -0.82dBm SG2 = -0.38dBm



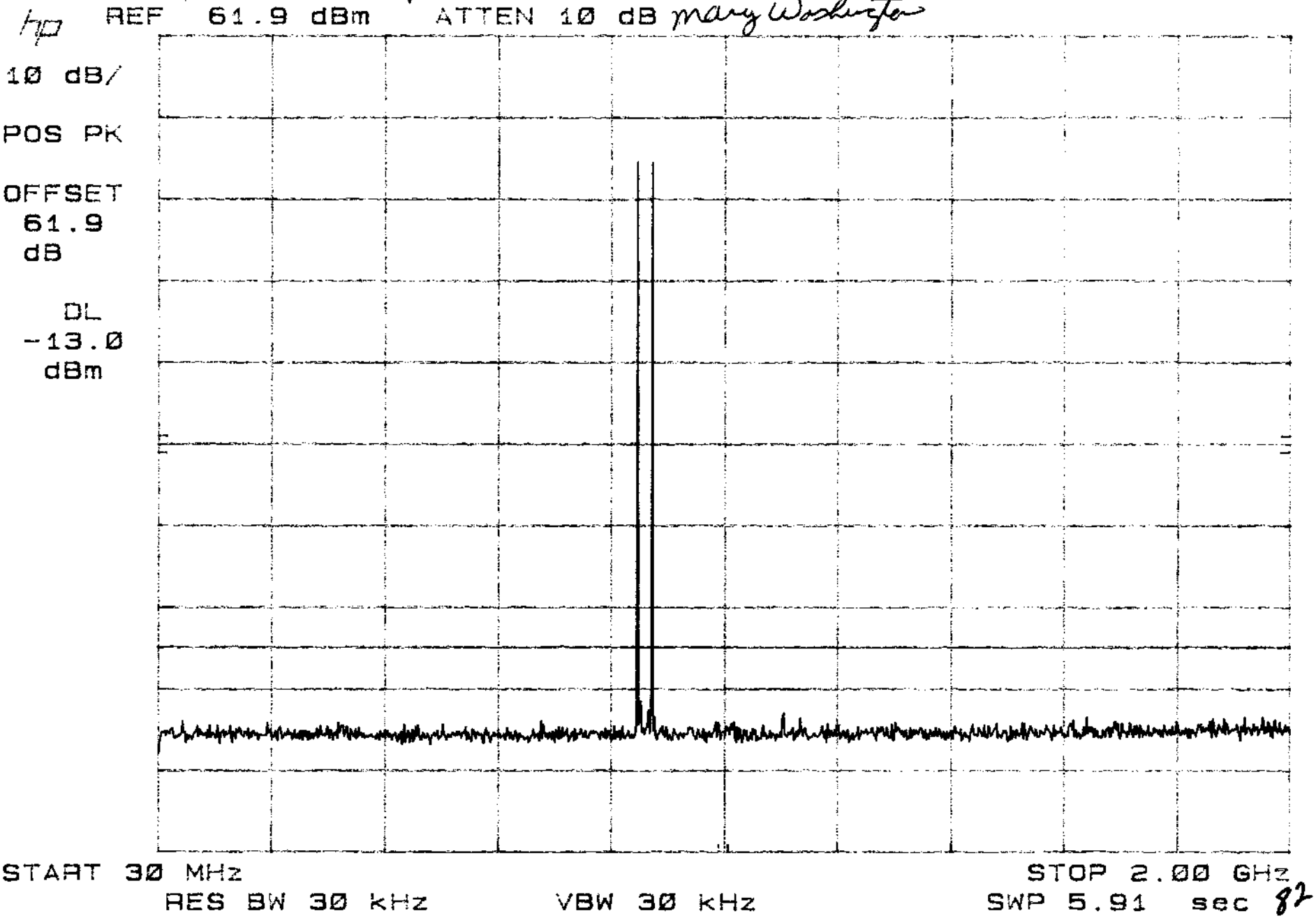
81

2/4/99
powerware
90 W

5904/6
2.991 & 22.917
Spurious Emission

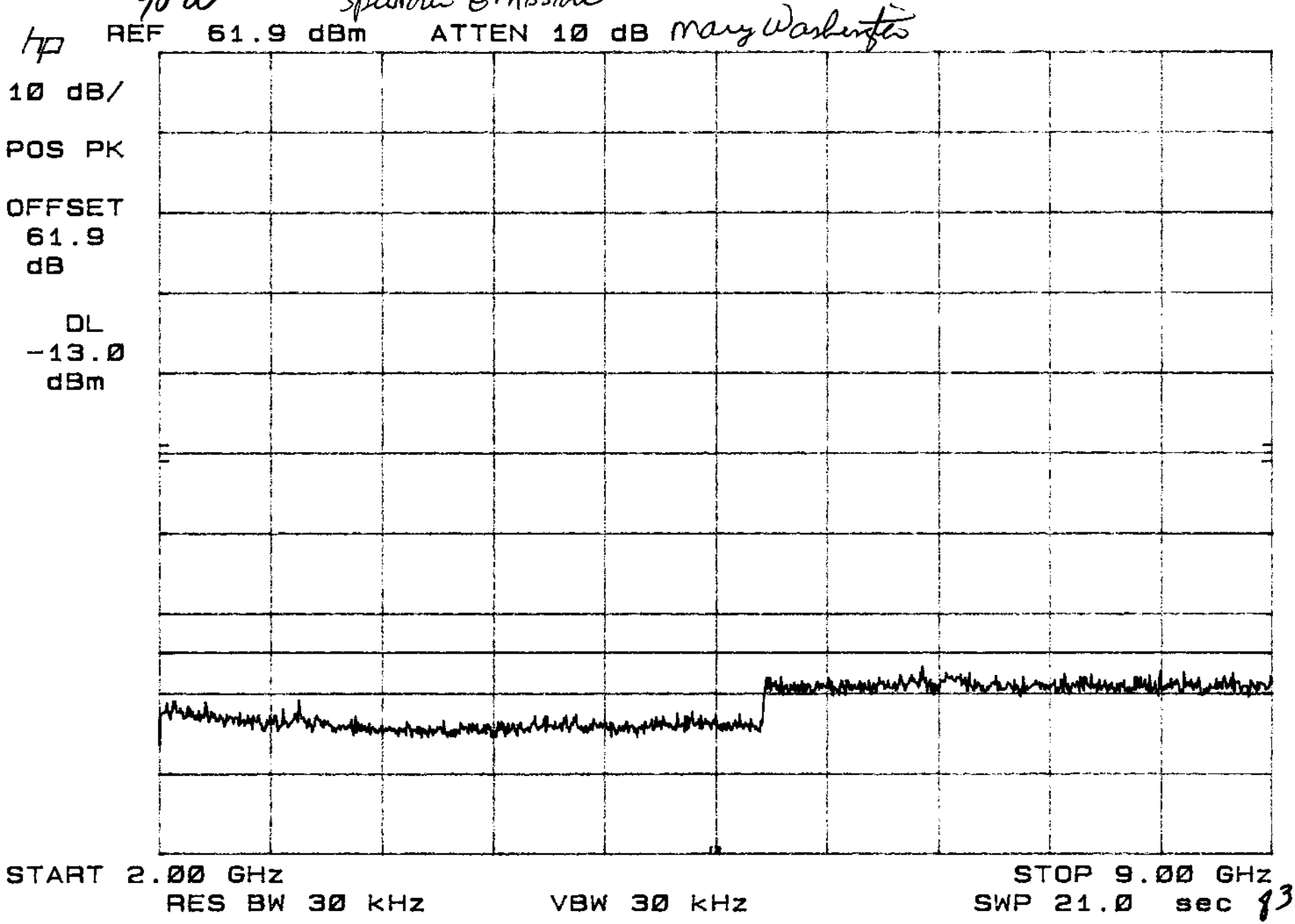
TDMA
f_1 = 869 f_2 = 894

SG1 = -0.82 dBm
SG2 = -0.38 dBm



82

2/4/99 S9046 TDMA $f_1 = 869$ $F_2 - 894$ SG1 = -0,82dBm
Powercom 2.991422.917 SG2 = -0.38dBm
90 W Spurious Emissions



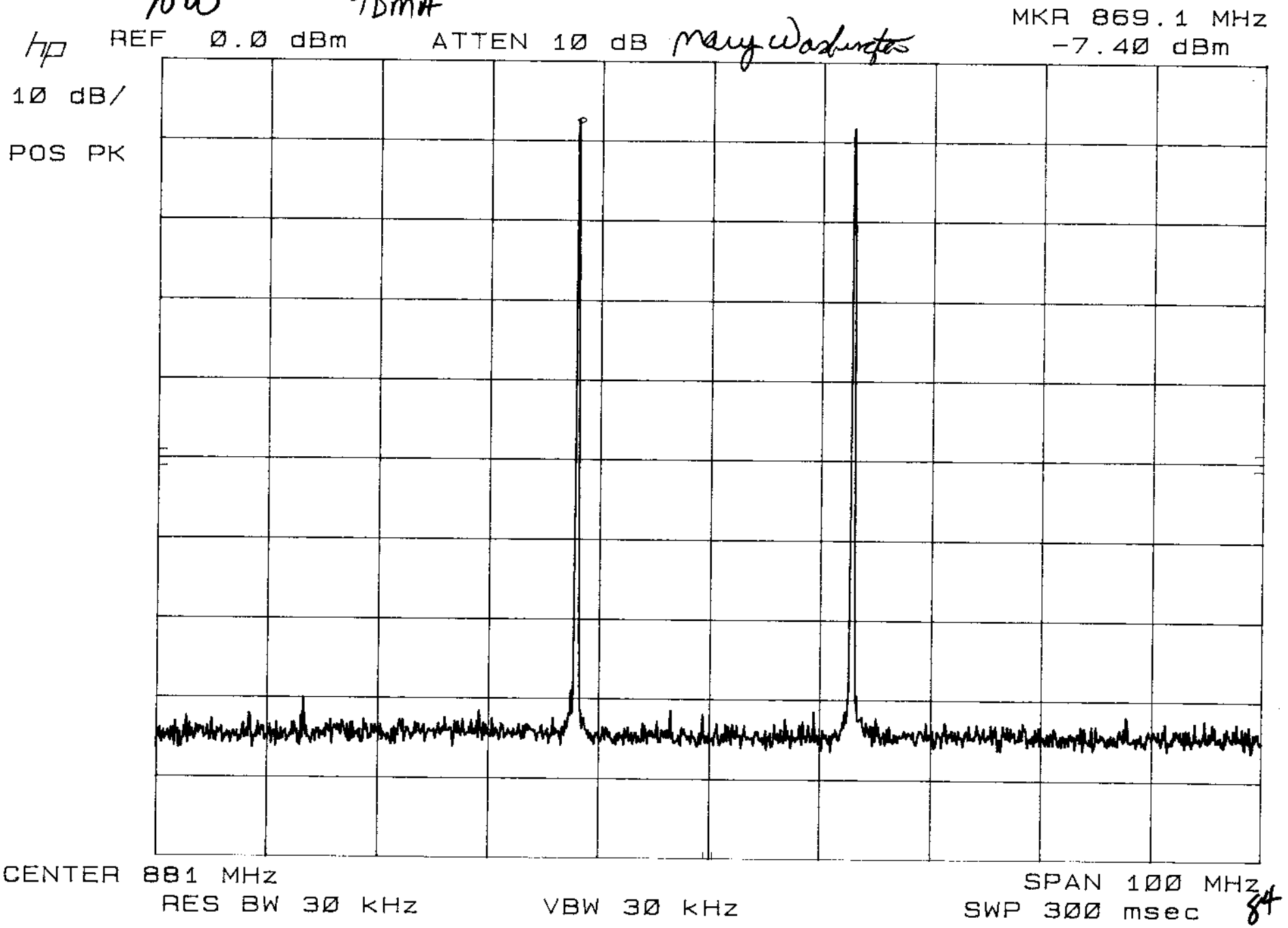
93

2/4/99
Powerwave
90 W

S9046
Output plot
TDMA

SG1 = -0.82 dBm
SG2 = -0.38 dBm

f_1 = 869
f_2 = 894



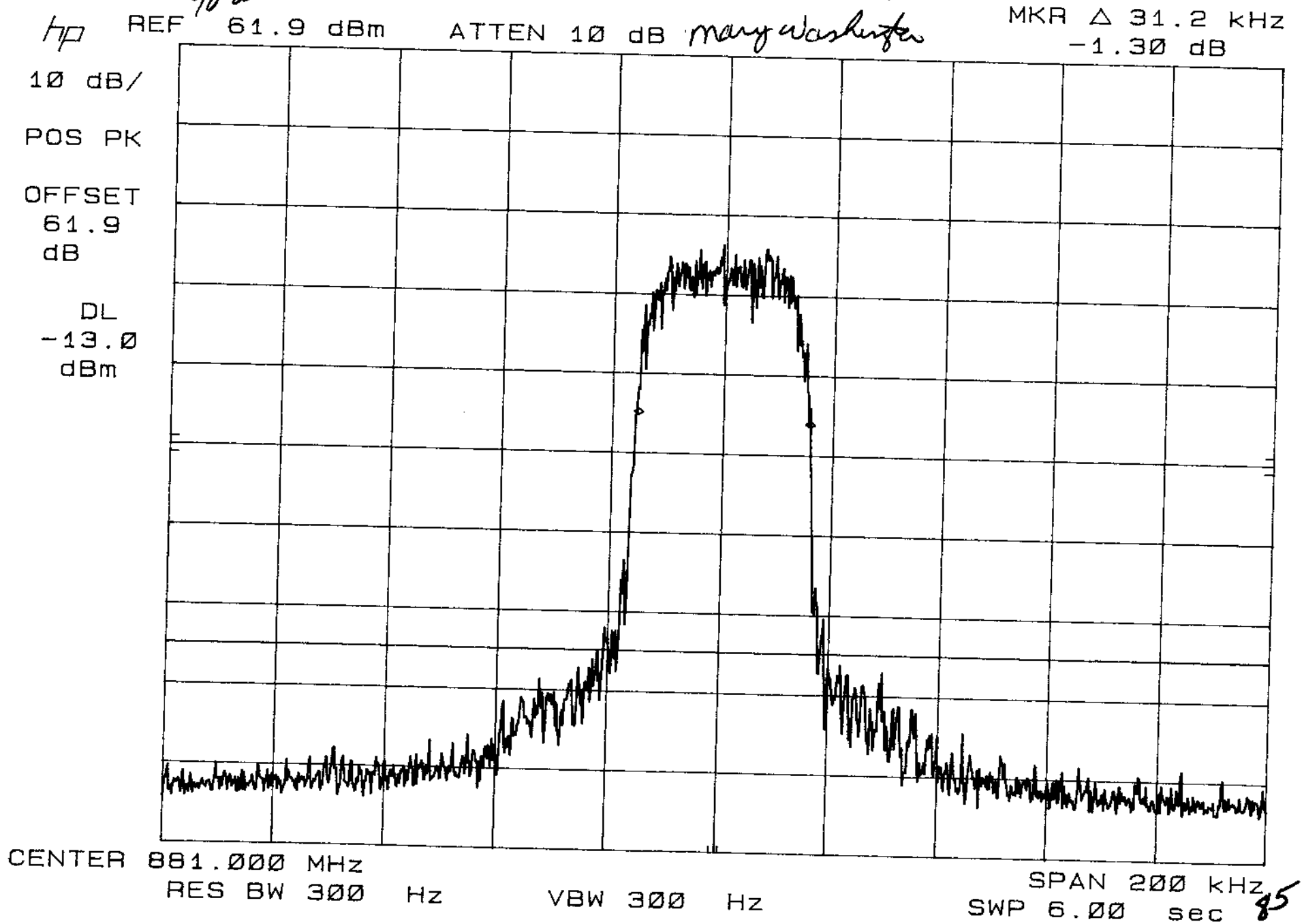
84

2/4/99
Powerman
90 W

59046
RSS-131, 6.2
2 789 + 22.917

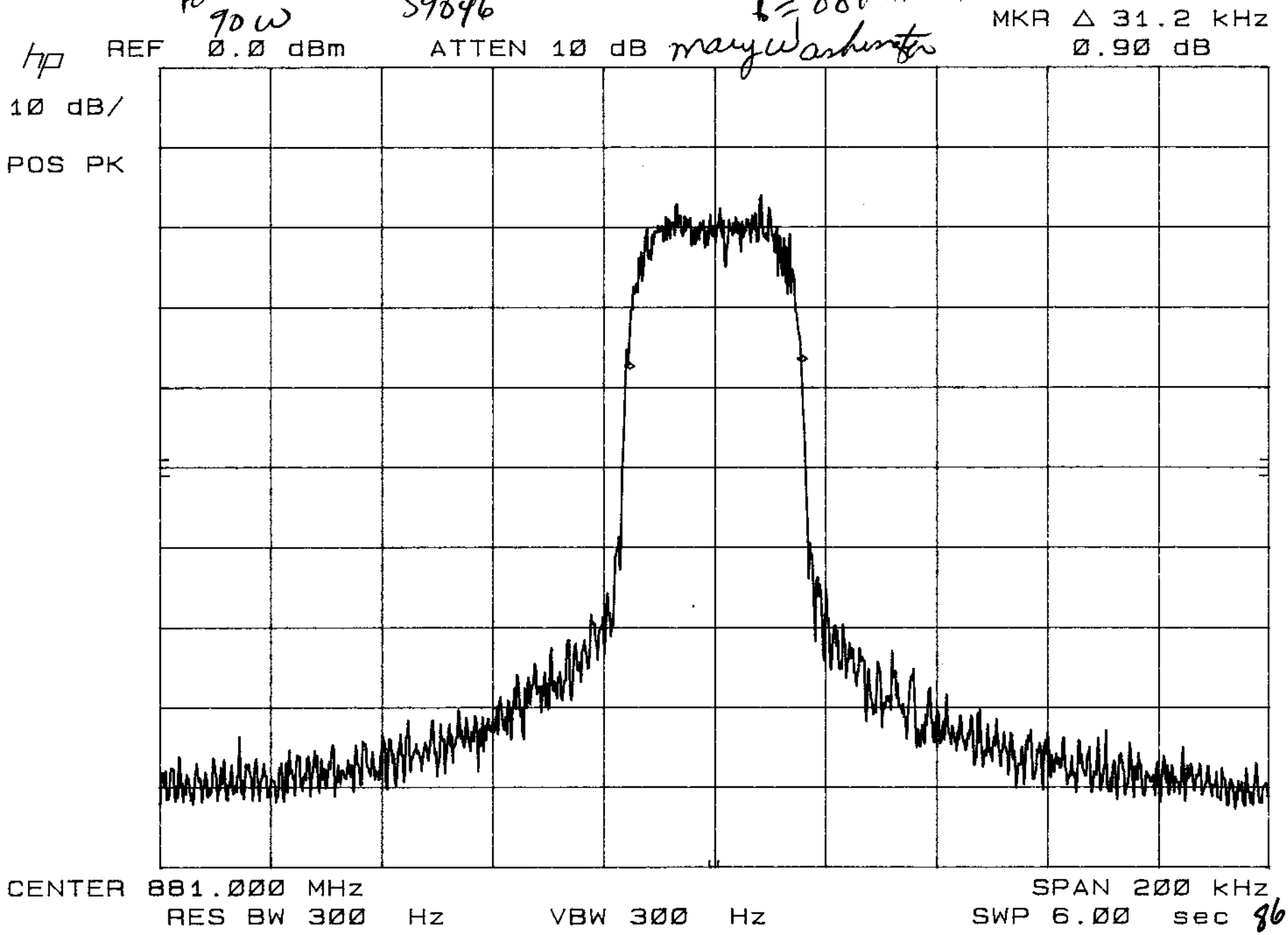
TDMA f_0 = 881.01 MHz

S61 - 2.2 dBm



85

2/4/99 Powerwave 90W output plot S9096 TDMA S61 = 2.2dBm f = 881MHz



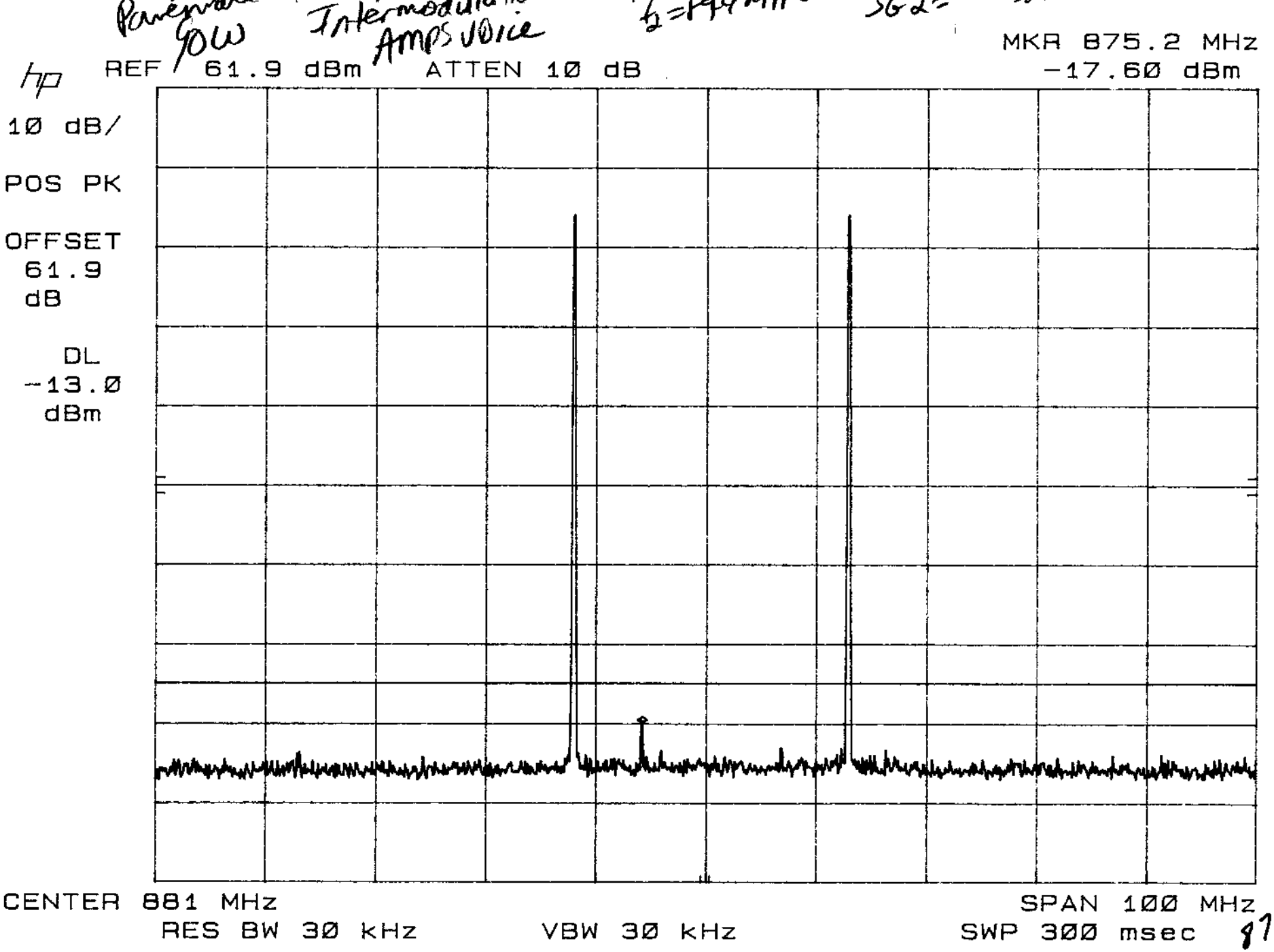
mary washington

2/4/99
Powerware
90W

S9046
Intermodulation
AMPS Voice

f_1 = 869 MHz
f_2 = 894 MHz

SG1 = -0.92 dBm
SG2 = -0.38 dBm



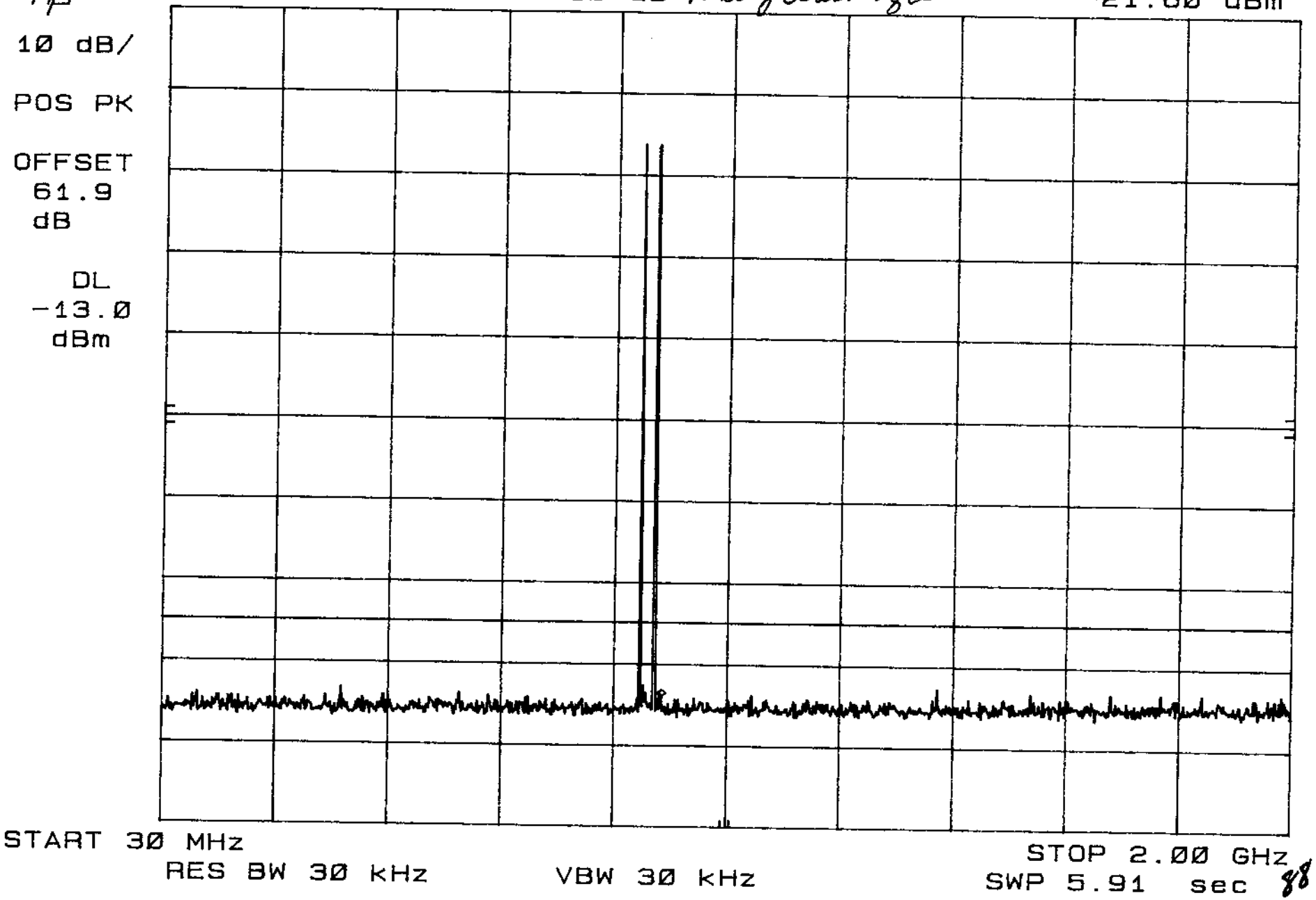
2/4/99
Powerwave
90W

S9096
2.991 + 22.917
spurious

AMPS VOICE

SG2 = -0.38dBm
f_1 = 869 MHz f_2 = 894 MHz
SG1 = -0.9 dBm

Mary Washington

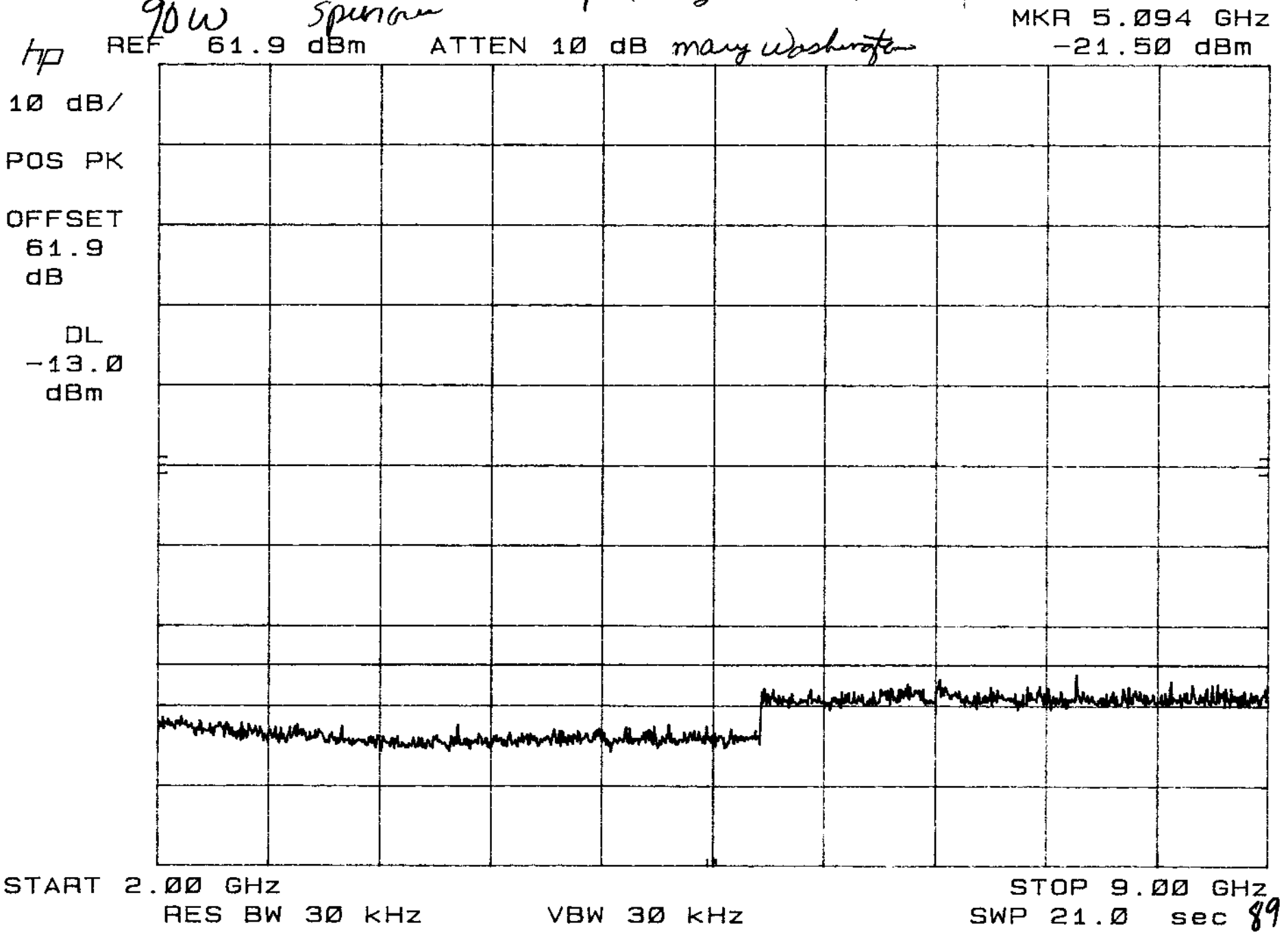


88

2/4/99 59046
Powerwave 2.991+22.917
90W Spurious

AMPS voice
f_1=869 f_2=894

SG1 = -0.9dBm SG2 = -0.38dBm



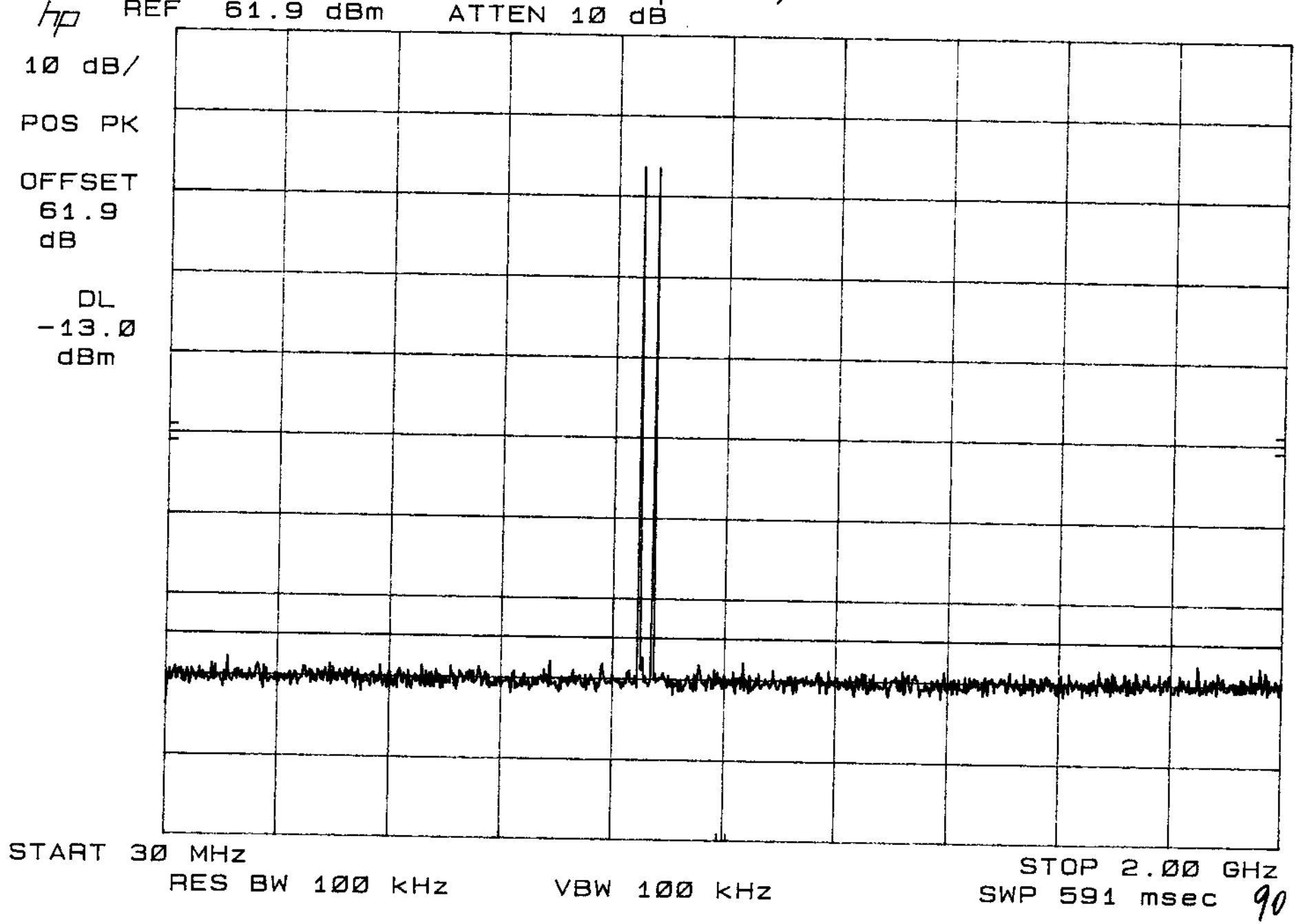
89

2/4/99
Powerwave
90 W

~~Dupont 70+~~ Supurna
ATMP Voice
S904/6

f_1 = 869 MHz
f_2 = 894.9417
(SS-131, 6.6

S61 = -0.9 dBm
S62 = -0.38 dBm



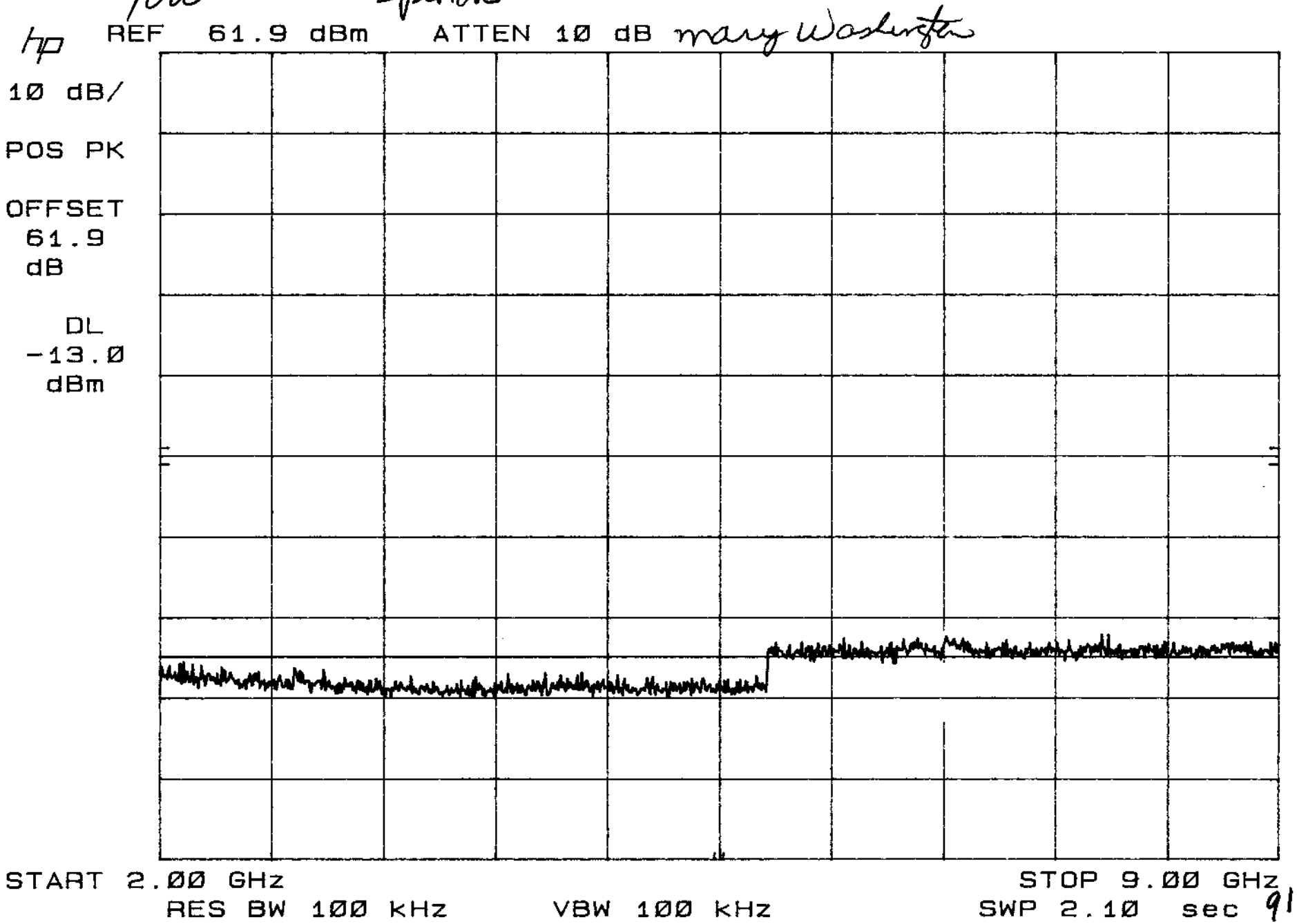
90

2/4/99
Powerwave
90W

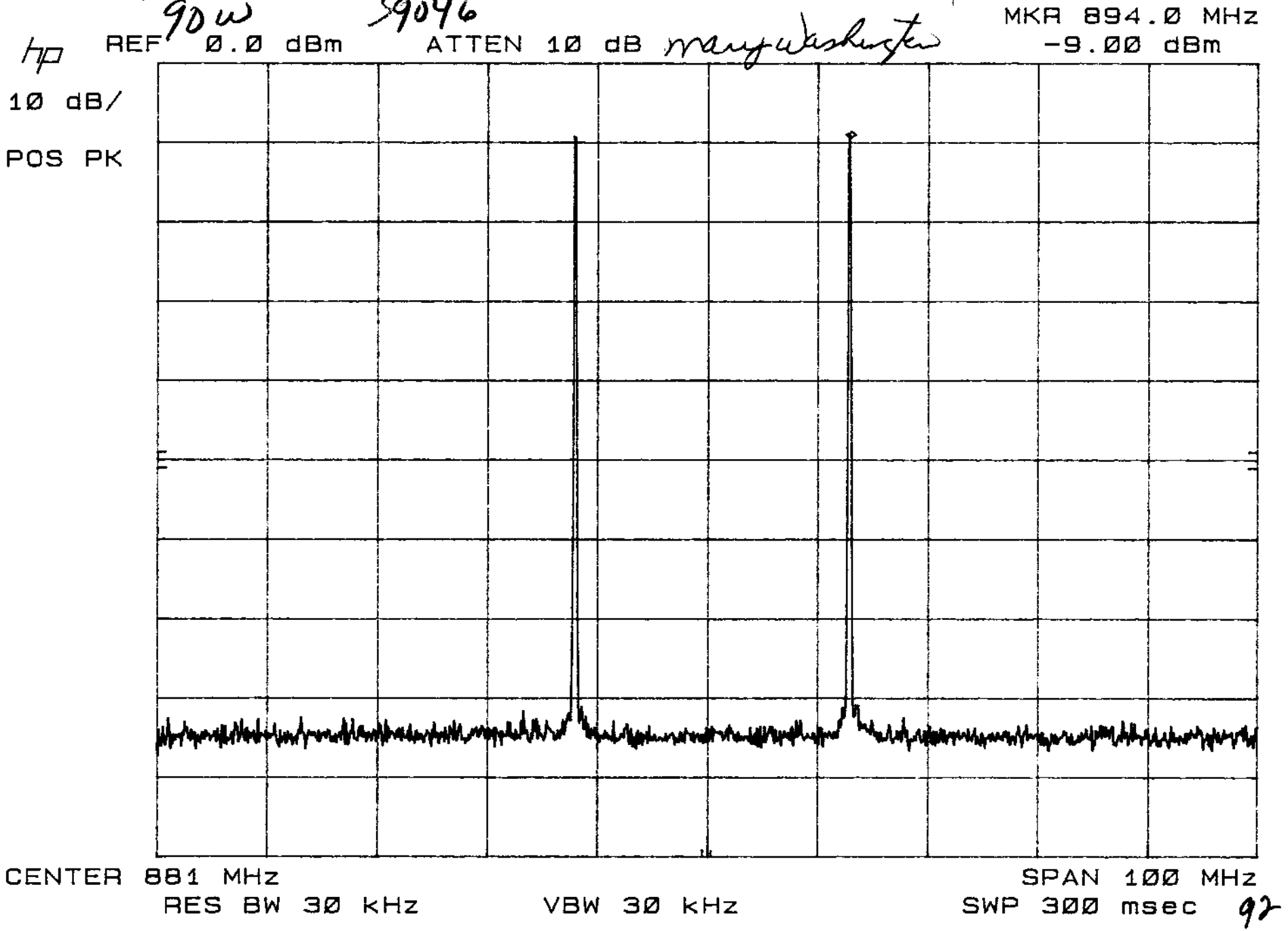
S9046
RSS-131, 6.6
Spurious

AMPS Voice
f_1=869 f_2=894.

SG1 = -0.9 dBm
SG2 = -0.38 dBm



2/4/99 Input Plot f_1=869 f_2=894 SGL = -0.9 dBm
Powerware AMPS Voice IM3 = -0.38 dB
90 W 5904/6



92

2/4/99 Powerware 90W

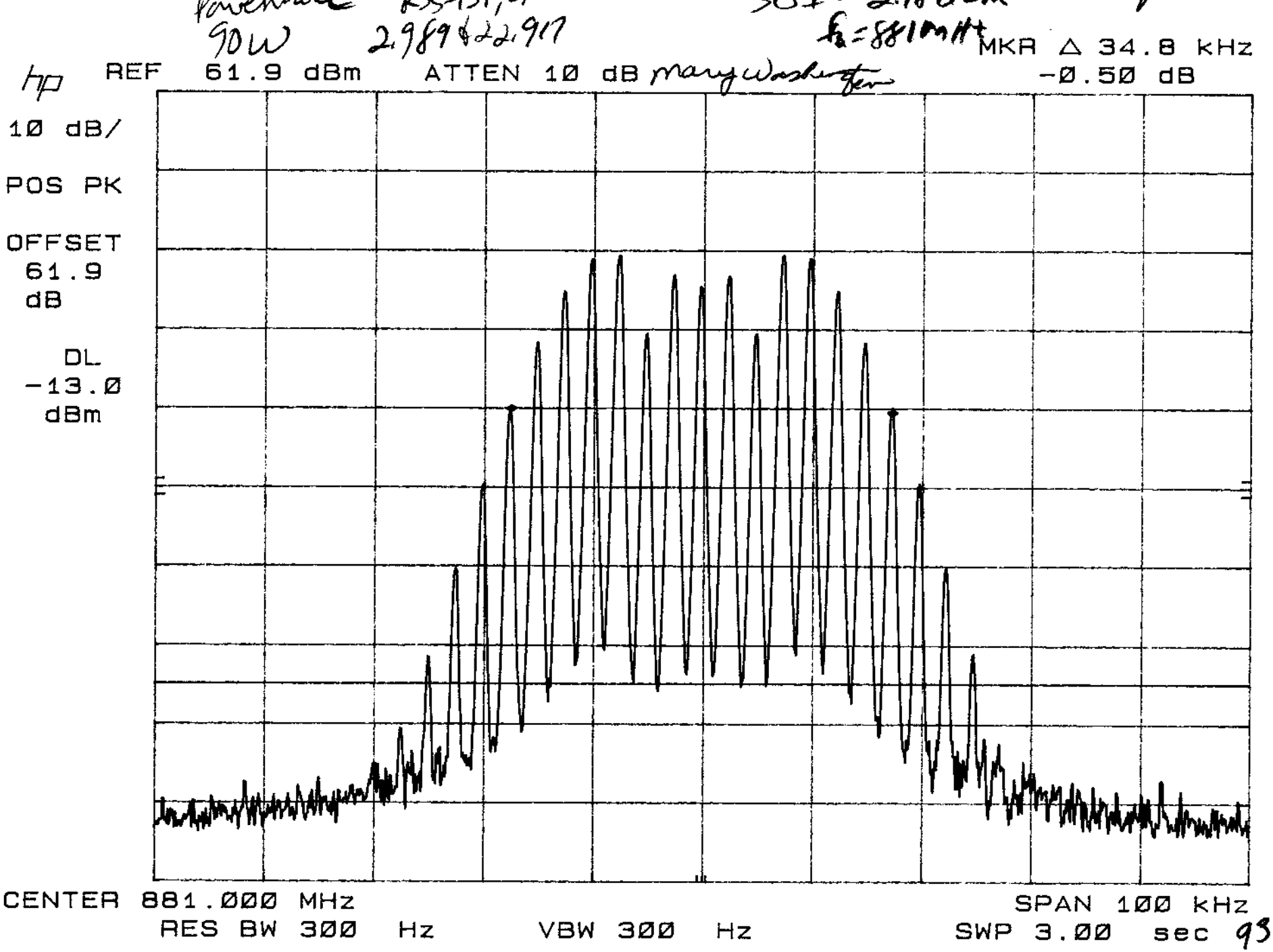
59046 RSS-131, 6.2 2.989 & 2.917

AMPS Voice

SG1 = 2.18 dBm

f_2 = 881.0 MHz

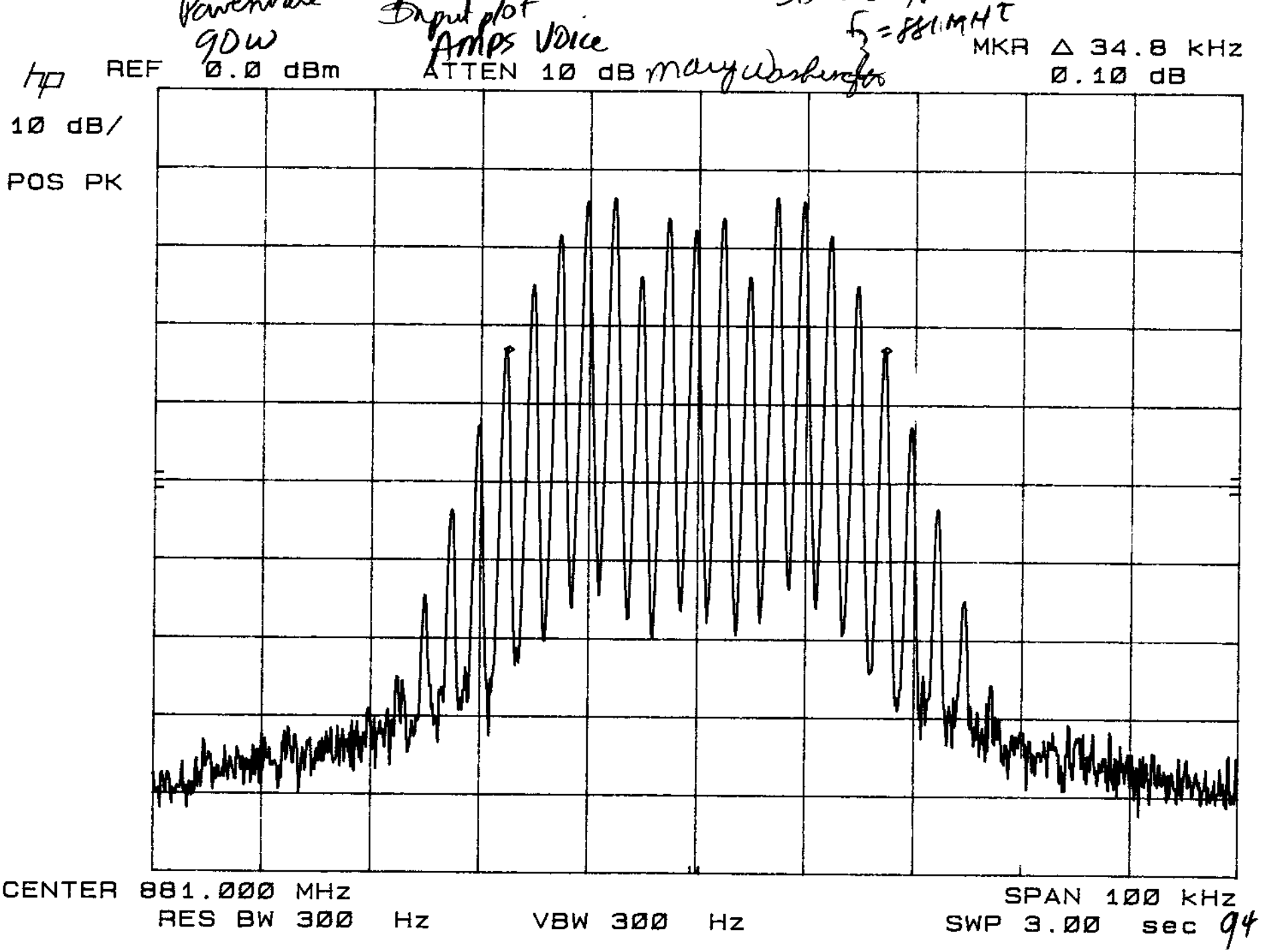
Occupied Bandwidth



93

2/4/99 S1096
Powerwave
90W
Output plot
Amps Voice

S6 = 2.18 dBm
f_3 = 881 MHz



mary washington

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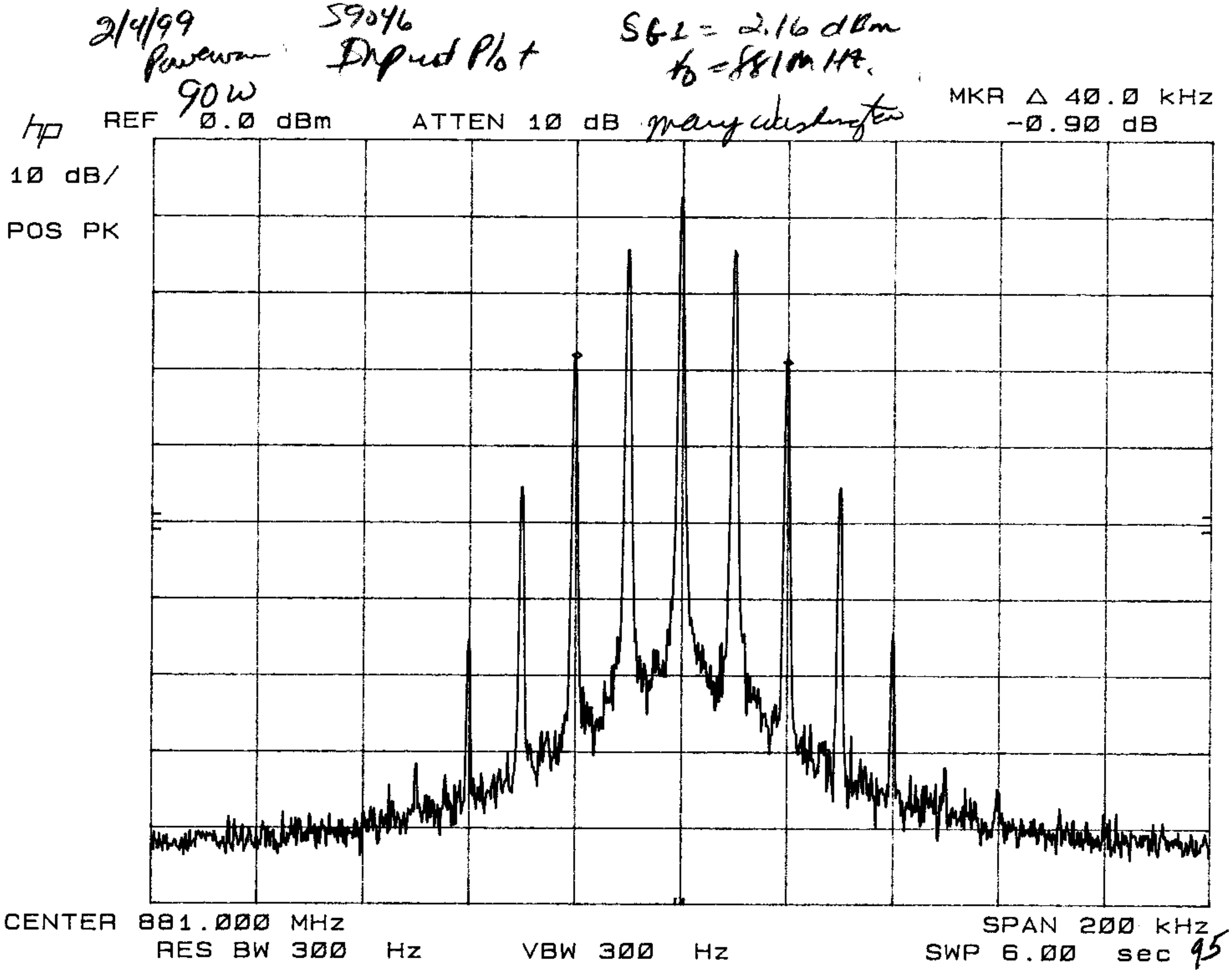


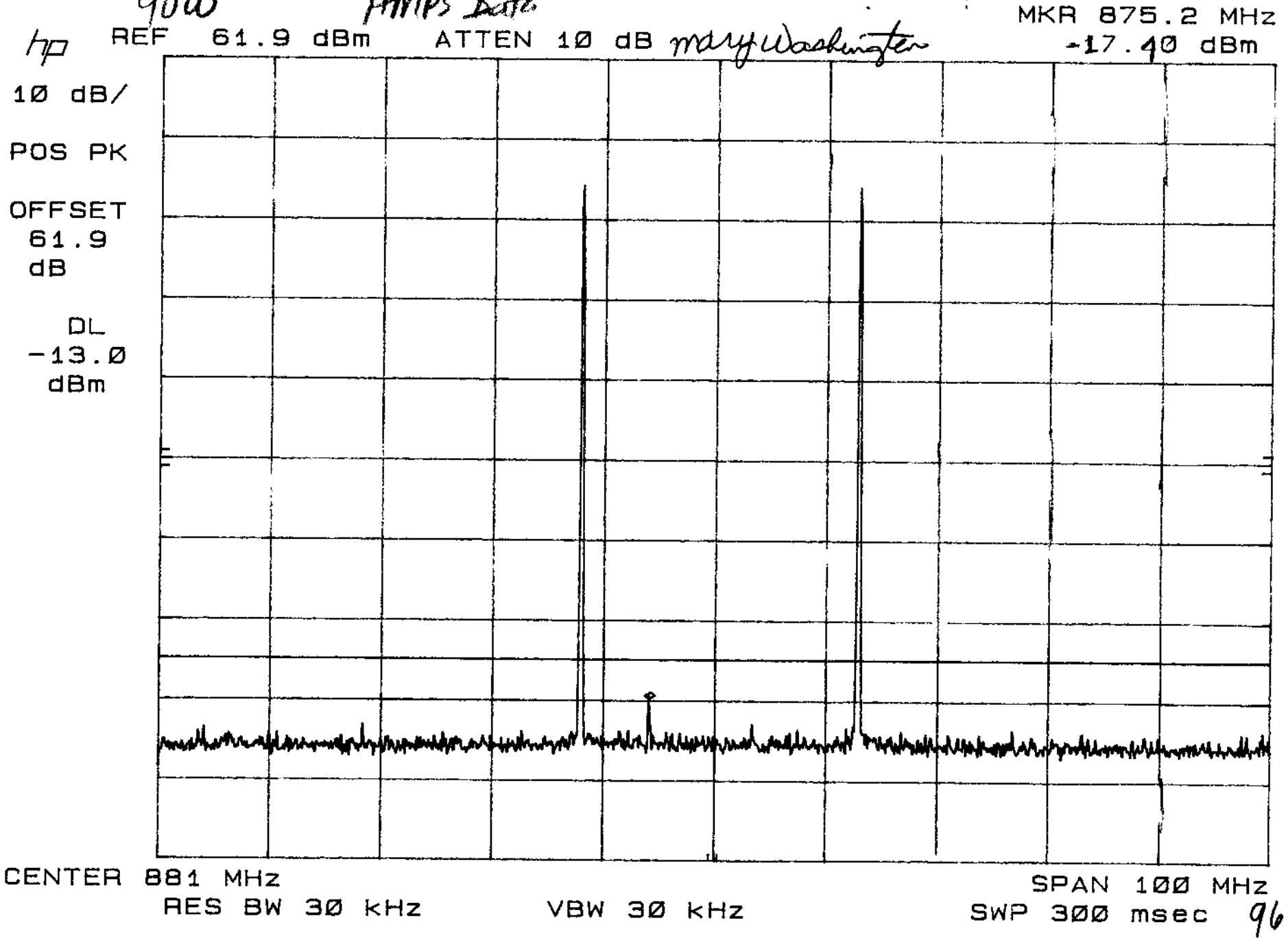
2/4/99
Powerwave
90 W
59046
SG1 = 2.16 dBm
fo = 881 MHz.
MKR △ 40.0 kHz
-0.90 dB
hp
REF 0.0 dBm
ATTEN 10 dB
10 dB/
POS PK
CENTER 881.000 MHz
SPAN 200 kHz
RES BW 300 Hz
VBW 300 Hz
SWP 6.00 sec
95

2/4/99
Powerwave
90W

59046
Intermodulation
AMPS Data

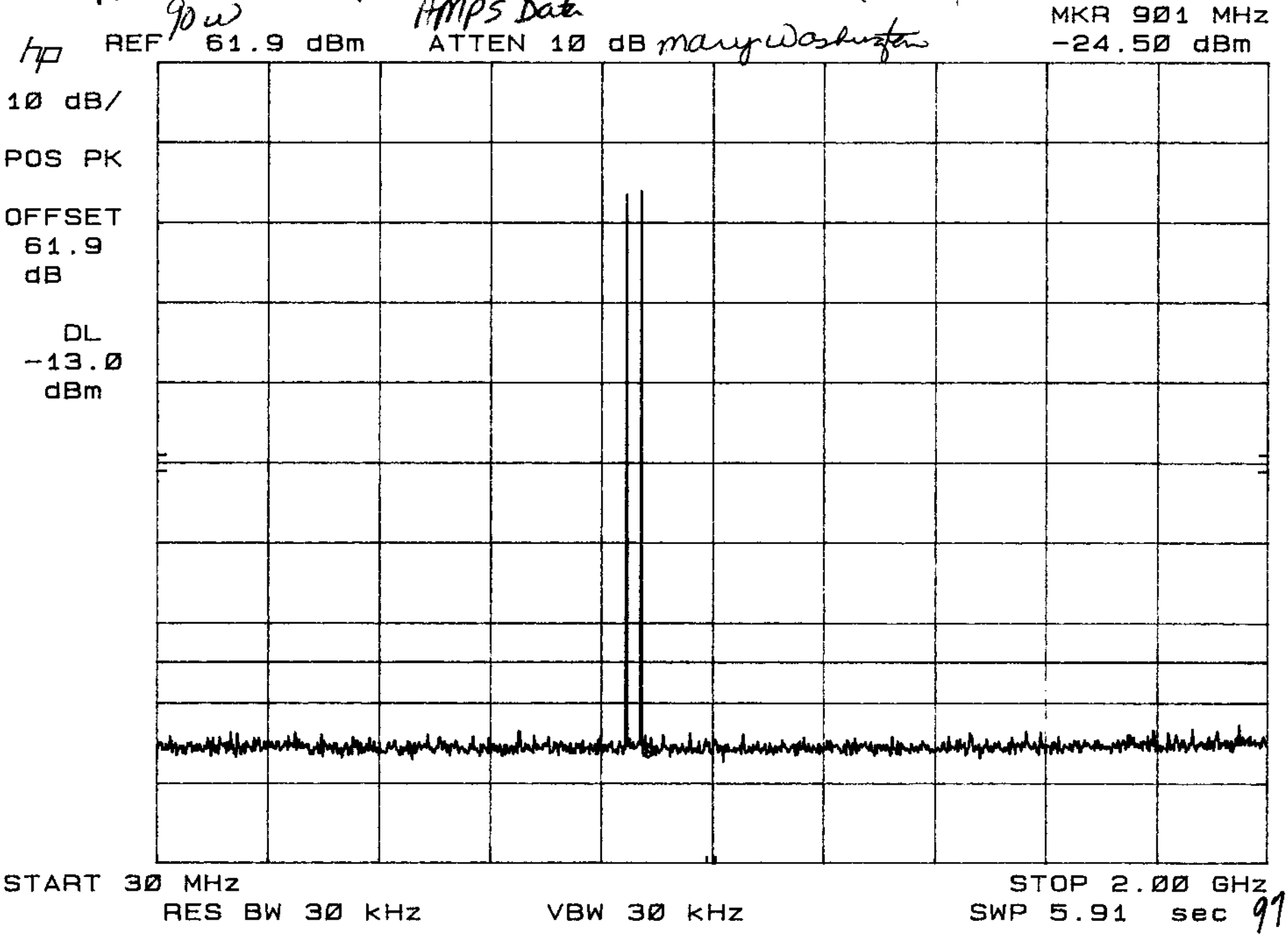
f_1 = 869 mHz
f_2 = 894 mHz

SG1 = -0.92 dBm
SG2 = -0.91 dBm



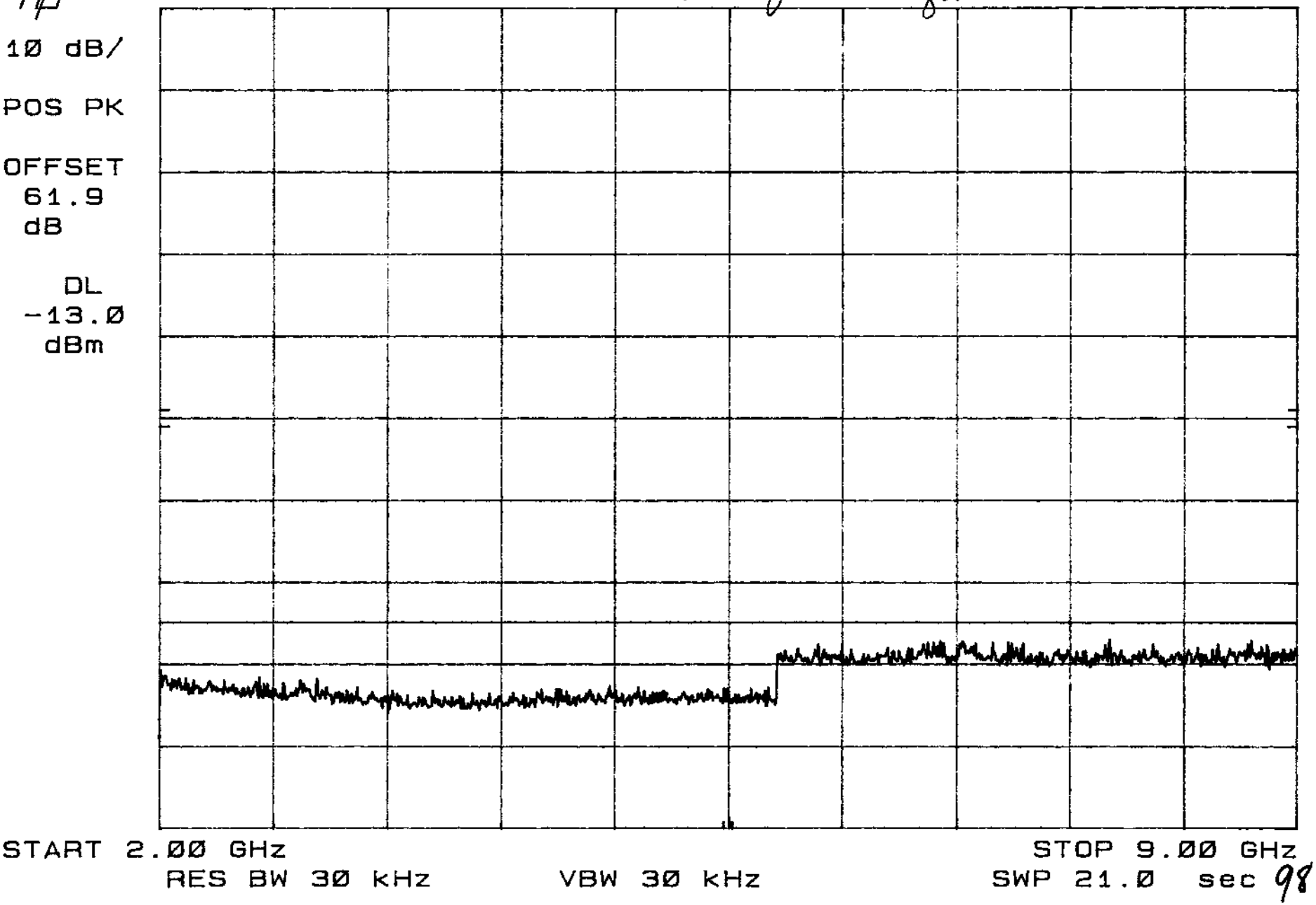
96

2/4/99 Powerware 90 w 5904 Spurious-Emission AMPS Data 2.991+2.917 f_1 = 869 f_2 = 894 SG1 = -0.92dBm SG2 = -0.44dBm



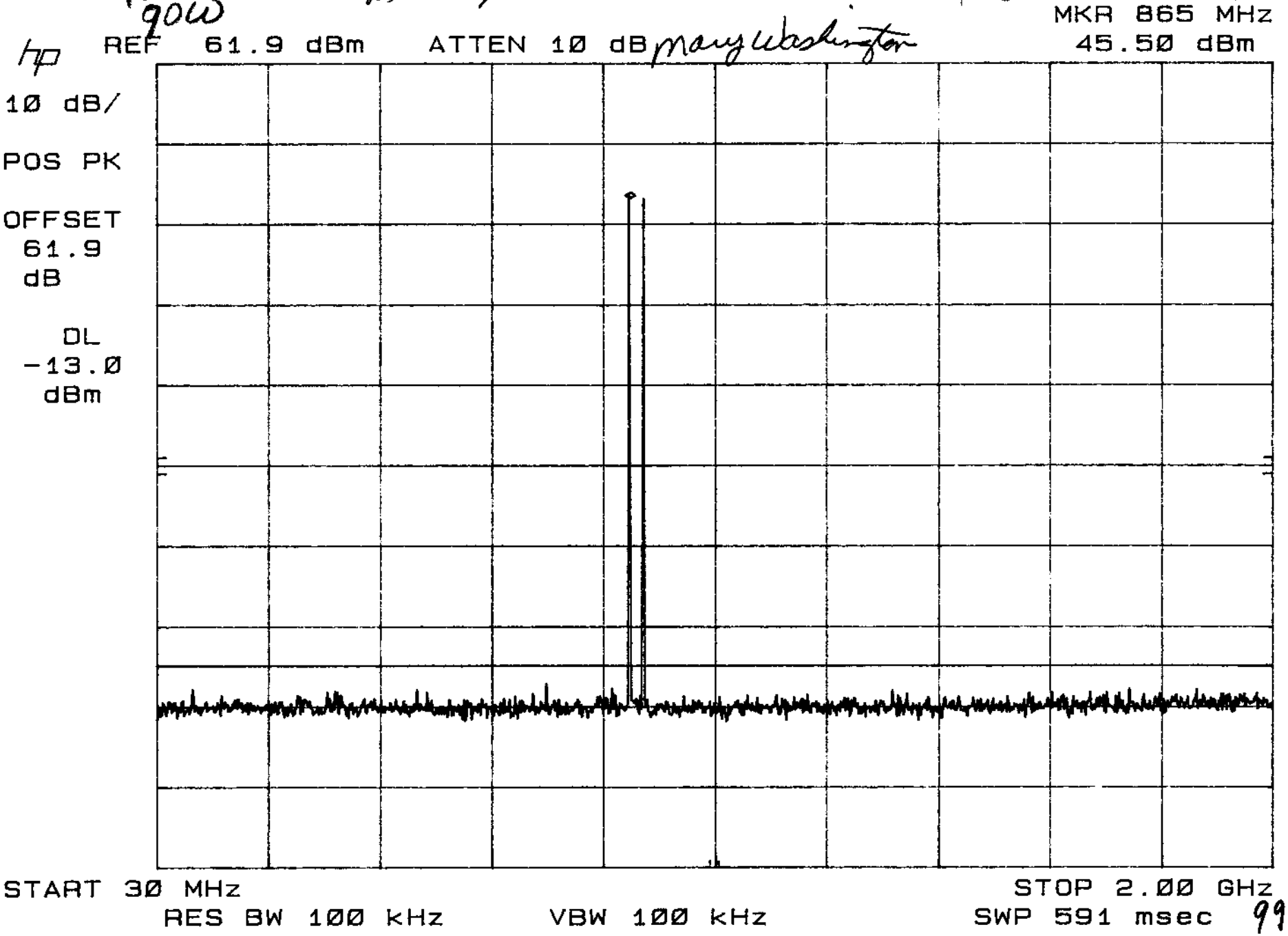
91

2/4/99 S9046 AMPS Data f_1=869 f_2=894
Powerwave 2.991 & 22.917 SG1: -0.92dBm SG2: -0.44dBm
9DW Spectrum Mary Washington



98

2/4/99 S9046 spurious $f_1 = 869$ $f_2 = 894$ SG1 = -0.92 dBm
Powerwave RSS-131, 6.6 SG2 = -0.44 dBm
90W



99

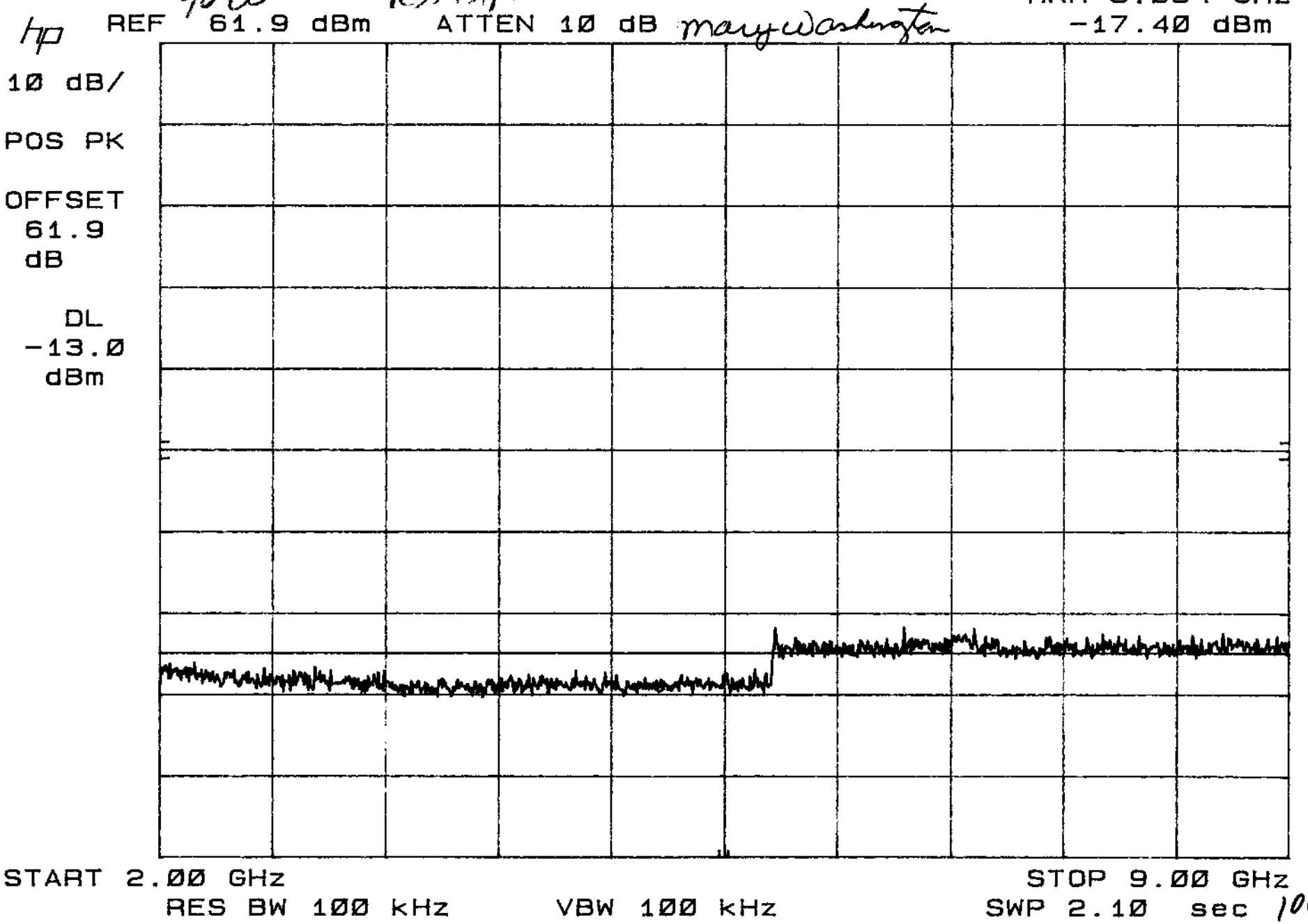
2/4/99 Powerwave 90 W

5904b Spurious RSS-131, 6.6

f_1 = 869.04 MHz f_2 = 894 AMPS Data.

SG1 = -2.92 dBm

SG2 = -0.44 dBm



mary Washington

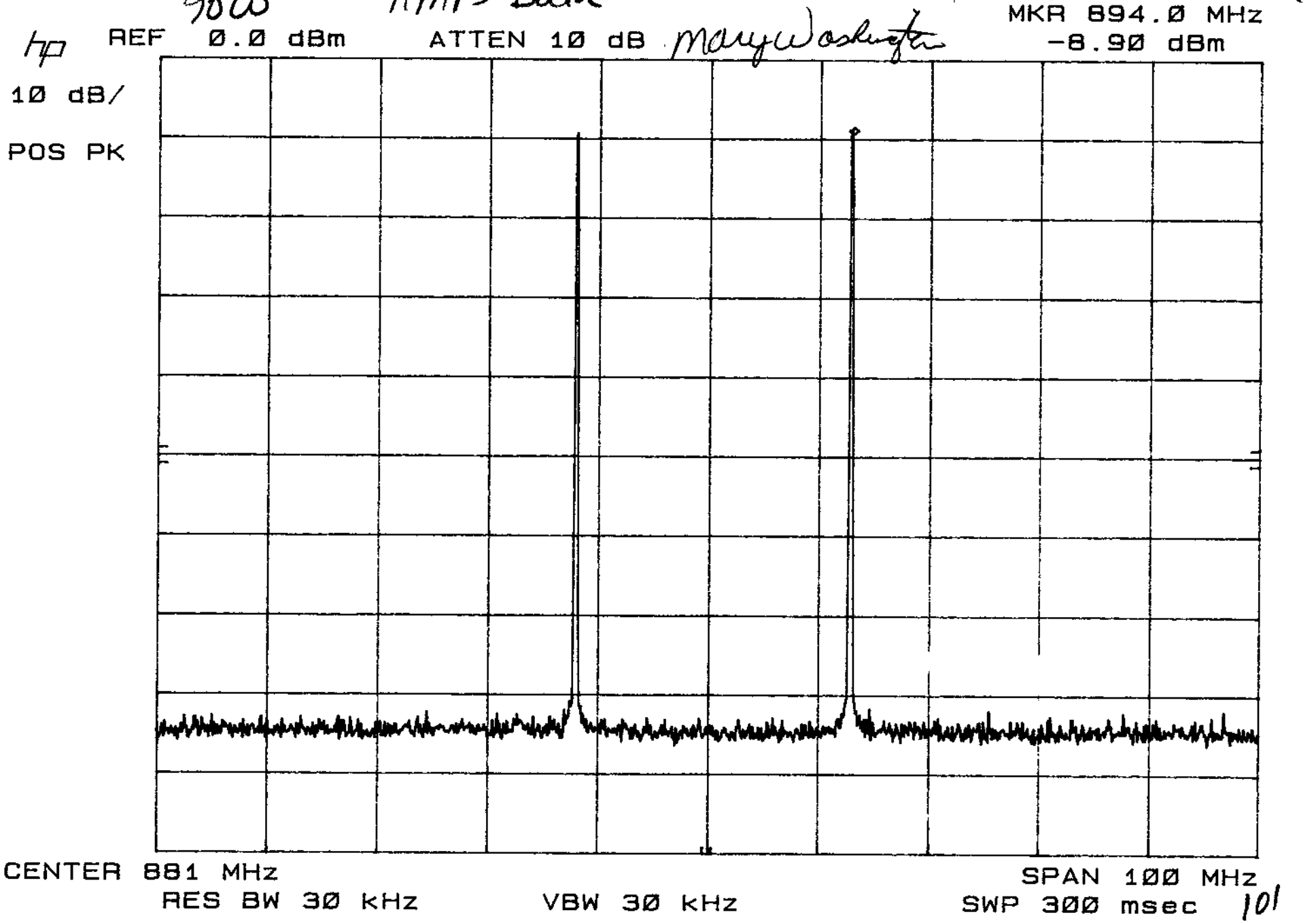
100

2/4/99
Powerwave
90W

Output plot
AMPS Data

$f_1 = 869$ $f_2 = 894$

SG1 = -0.92 dBm
SG2 = -0.44 dBm



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7 SIGNATURE PAGE

GENERAL REMARKS:

SUMMARY:

All tests according to the standards sited on page 1 of this report.

■ - 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)