

TEST SPECIFICATION:

**FCC "Rules and Regulations", Part 74,**  
Experimental Radio, Auxiliary, Special Broadcast and Other Program  
Distribution Services for Operation in the

614 to 806 MHz Band

Subpart H, Low Power Auxiliary Stations  
Sections 74.801 to 74.882

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name: Shure Brothers Wireless PSM 700 Transmitter

Kind of Equipment: Wireless Personal Stereo Monitor System 6825

Test Configuration: NA

Emission Designator: 196KF8E

Transmitter FCC ID: DD4P7T

Model Number: P7T6825

Serial Number: NA

Dates of Test: August 4 & 7 1998

Test Conducted For: Shure Brothers Incorporated

222 Hartrey Avenue

Evanston, Illinois 60202

NOTICE: Please see change information listed inside of this report. This report must not be used by the customer to claim product endorsement by NVLAP or any agency of the United States Government, and it cannot be reproduced (except in full), without the approval of D.L.S. Electronic Systems Inc.

SIGNATURE PAGE

Report Written By:



Arnom C. Rowe  
Test Engineer  
EMC-001375-NE

Report Reviewed by:



Jack Prawica  
Lab Manager

Report Approved by:



Brian J. Mattson  
General Manager

Company Official:

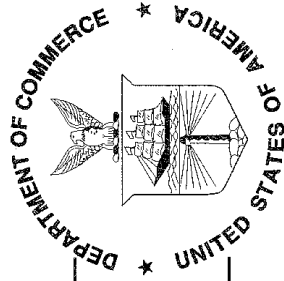


**Shure Brothers Incorporated**

NOV. 9, 1998

United States Department of Commerce  
National Institute of Standards and Technology

**NVLAP<sup>®</sup>**



ISO/IEC GUIDE 25:1990  
ISO 9002:1987

**Certificate of Accreditation**

**D.L.S. ELECTRONIC SYSTEMS, INC.**  
WHEELING, IL

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

**ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS  
FCC**

September 30, 1999

Effective through

For the National Institute of Standards and Technology

NVLAP Lab Code: 100276-0

National Institute  
of Standards and Technology



National Voluntary  
Laboratory Accreditation Program

ISO/IEC GUIDE 25:1990  
ISO 9002:1987

## Scope of Accreditation



Page: 1 of 1

**ELECTROMAGNETIC COMPATIBILITY  
AND TELECOMMUNICATIONS**

**NVLAP LAB CODE 100276-0**

**D.L.S. ELECTRONIC SYSTEMS, INC.**

1250 Peterson Drive  
Wheeling, IL 60090-6454  
Mr. Brian J. Mattson

Phone: 847-537-6400 Fax: 847-537-6488

*NVLAP Code Designation / Description*

### **International Special Committee on Radio Interference (CISPR) Methods**

12/CIS22 IEC/CISPR 22:1993: Limits and methods of measurement of radio disturbance characteristics of information technology equipment

### **Federal Communications Commission (FCC) Methods**

12/F01 FCC Method - 47 CFR Part 15 - Digital Devices  
12/F01a Conducted Emissions, Power Lines, 450 KHz to 30 MHz  
12/F01b Radiated Emissions

### **Australian Standards referred to by clauses in AUSTEL Technical Standards**

12/T51 AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment

September 30, 1999

Effective through

A handwritten signature in black ink, appearing to read 'James L. Galt', is written over a horizontal line.

For the National Institute of Standards and Technology





1.	Cover Page	i
2.	Signature Page	ii
3.	NBS Certificate of Accreditation	iii
5.	Table of Contents	iv
7.	Summary of Test Report	1.0
7.	Introduction	2.0
7.	Object	3.0
7.	Test Set-up	4.0
8.	Test Equipment (Bandwidths and Detector Function)	5.0
8.	RF Power Output	6.0
9.	Graphs taken of the RF output showing system and filter losses	6.0
11.	Modulation Characteristics	7.0
12.	Graphs taken showing the Frequency Response of the Audio Modulating Circuit	7.0
14.	Occupied Bandwidth	8.0
15.	Graphs taken of the Occupied Bandwidth	8.0
16.	Frequency Deviation	9.0
17.	Graphs taken of the Frequency Deviation	9.0
18.	Spurious Emission Measurements at Antenna Terminals	10.0
19.	Conducted Emission Data taken	10.0
23.	Conducted Emission Graphs Taken	10.0



36.	Field Strength of Spurious Emission Measurements	11.0
38.	Radiated Data taken for Field Strength Measurements	11.0
45.	Radiated Graphs taken for Field Strength Measurements	11.0
61.	Frequency Stability (Temperature)	12.0
62.	Graphs taken of Frequency Stability (Temperature)	12.0
73.	Frequency Stability (Voltage Variation)	13.0
74.	Graphs taken of Frequency Stability	13.0
78.	Photo Information and Test Set-Up	14.0
79.	Photos Taken During Testing	15.0
81.	Change Information	16.0
83.	Results of Tests	17.0
83.	Conclusion	18.0
84.	Equipment List	TABLE 1



a. SUMMARY OF TEST REPORT

It was found that the Shure Brothers Wireless PSM 700 Transmitter S/N NA **meets** the radio interference emission requirements of the FCC "Rules and Regulations", Part 74, Subpart H, Sections 74.801 to 74.882 for Low Power Auxiliary Stations operating in the 722 to 746 MHz Frequency Band.

b. INTRODUCTION

On August 4 & 7 1998, a series of radio frequency interference measurements were performed on Wireless Personal Stereo Monitor System 6825, S/N NA. The tests were performed according to the procedures of FCC as stated in Part 2 Subpart J, Equipment Authorization Procedures of the Code of Federal Regulations 47, by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

c. OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency emission requirements of the FCC "Rules and Regulations", Part 74, Subpart H, Sections 74.801 to 74.882 for Low Power Auxiliary Stations operating in the 722 to 746 MHz Frequency Band.

d. TEST SET-UP

All radiated emission tests were performed at D.L.S. Electronic Systems, Inc. The radiated tests were made with the test item placed on a wooden turntable located in the Test Room with the receive antenna placed one meter from the device under test.



e. TEST EQUIPMENT (Bandwidths and Detector Function)

All data was automatically plotted using peak detector function. This information was then used to determine the frequencies of maximum emissions. Manual measurements were performed on these frequencies using a peak detector function of the Analyzer with the bandwidths specified by the FCC. From 200 MHz to 1000 MHz a bandwidth of 100 kHz was used (except for Occupied Bandwidth), and above 1000 MHz, wide enough bandwidths were used, depending upon the test being made, to ensure proper measurement of the narrowband signal.

A list of the equipment used can be found in Table 1. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

f. RF POWER OUTPUT – PART 2.985

As stated in PART 74.861 (e-1), the output power should not exceed 250 milliwatts (24 dBm). The Shure Brothers Wireless PSM 700 Transmitter was tuned according to the tune-up procedures specified in Part 2.983 (d-5), and adjusted for its maximum output power. The RF output power was measured in the open field, using the following test method:

The radiated signal from the EUT was measured. The EUT was then substituted with a signal generator and a tuned dipole antenna. The output of the signal generator was increased until the level received by the tuned dipole equaled that of the previous measured from the EUT.

Actual Measurements Taken:

- g. dBuV Measured output of the transmitter  
+20.83 dBuV Total system losses (Antenna, Pads & Cable)
- h. dBuV which equals 0.07 watts

LIMIT:

Manufacturer's rated output power = 0.1 watts  
Tolerance = 50 ppm

MARGIN:

0.25 watts – 0.07 watts = 0.18 watts

**See the following graphs for actual measurements made:**



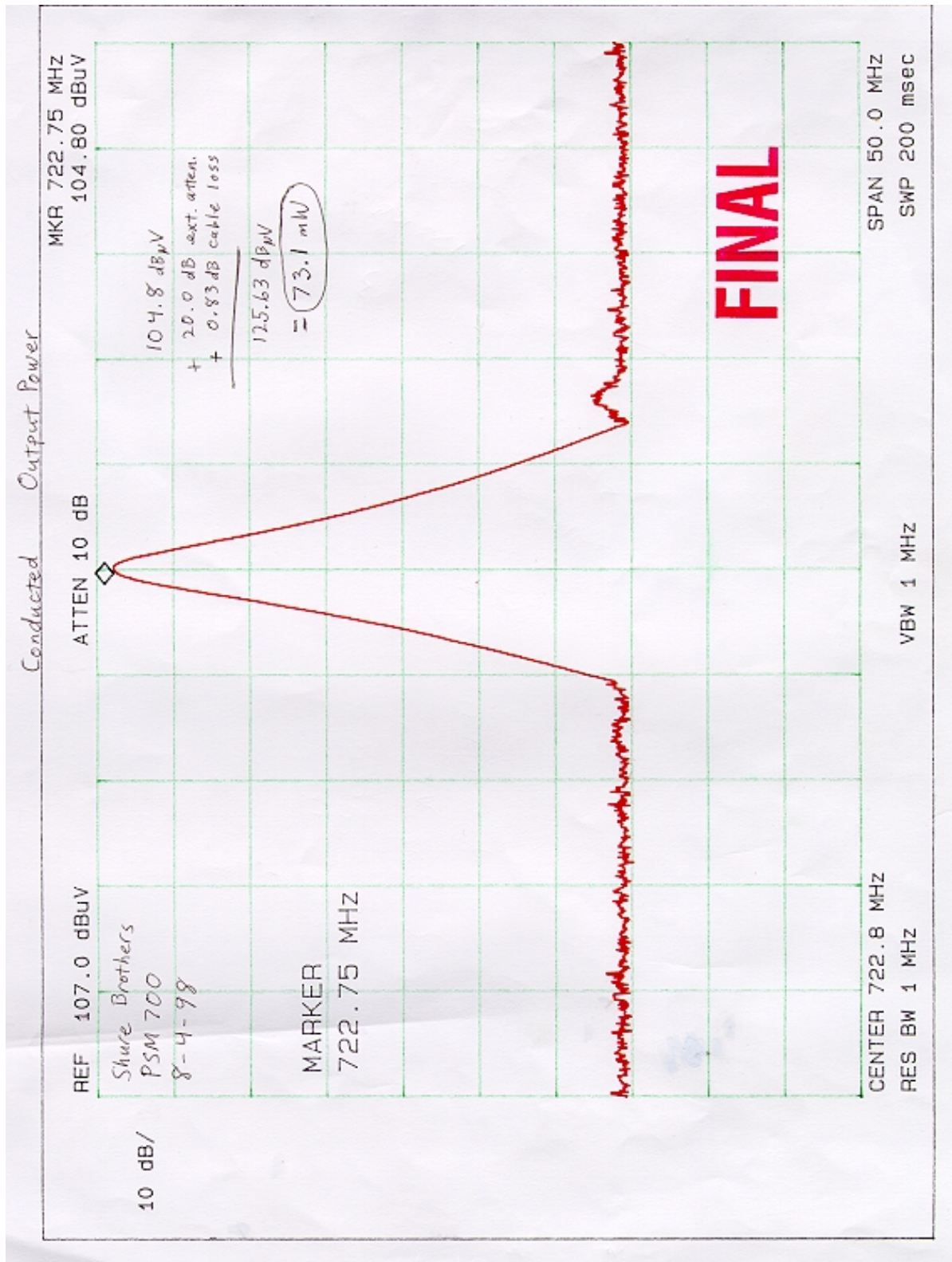
EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

## **GRAPHS TAKEN OF THE RF POWER**

### **OUTPUT MEASUREMENTS**

#### **PART 2.985**





## 7.0 Modulation Characteristics – Part 2.987

### a. Voice modulated communication equipment

A curve showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz is submitted with this report.

### b. Equipment which employs modulation limiting

A family of curves showing the percentage of modulation versus the modulation input voltage with sufficient information showing the modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

#### **NOTE:**

**See the following pages for the graphs of the actual measurements made:**



EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

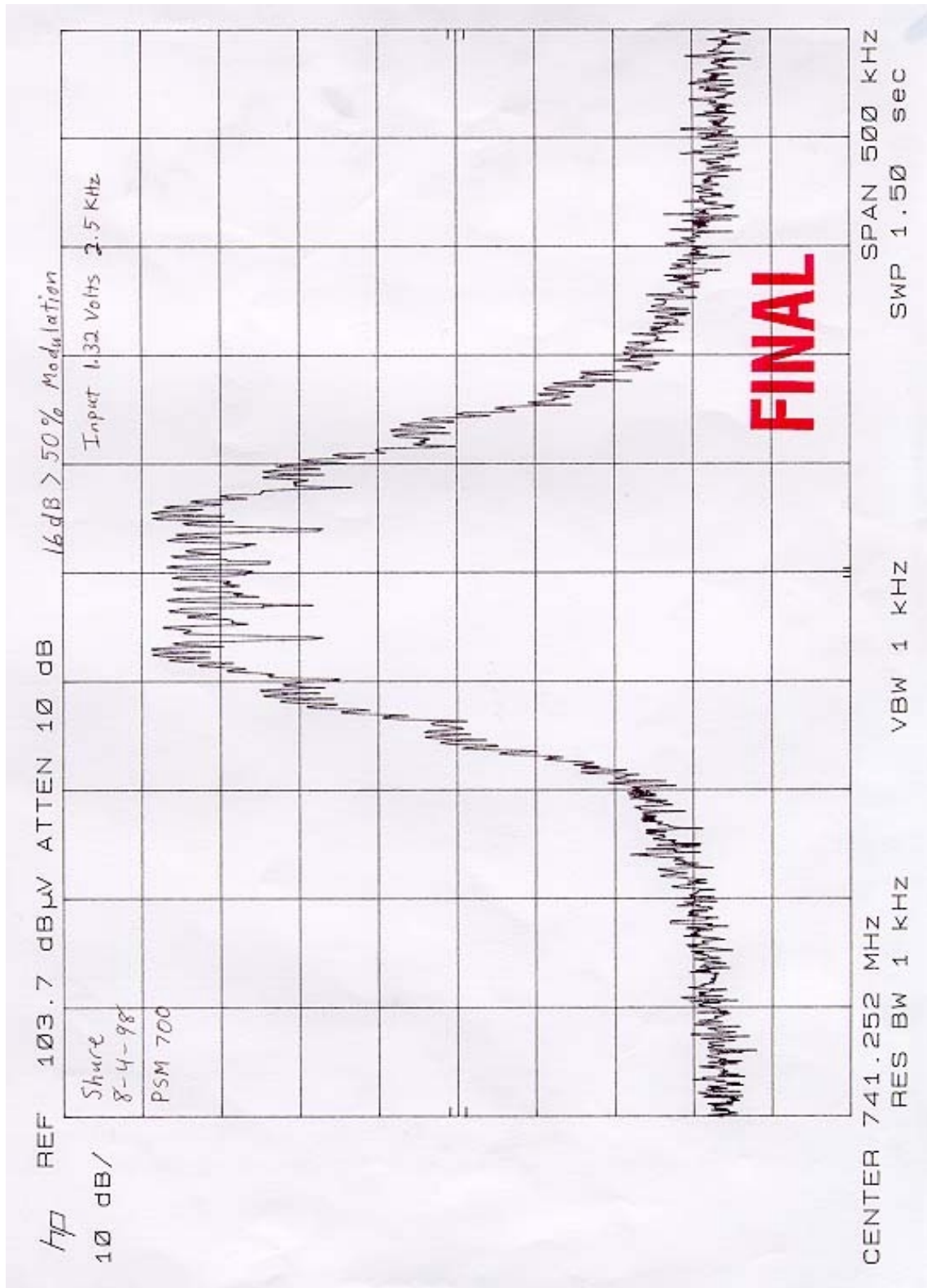
**GRAPHS TAKEN SHOWING THE FREQUENCY**

**RESPONSE OF THE**

**AUDIO MODULATING CIRCUIT**

**PART 2.987**







## 8.0 OCCUPIED BANDWIDTH – PART 2.989

The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to .5% of the total mean power radiated by a given emission.

As stated in Part 2.989 c-1 the Shure Brothers Wireless PSM 700 Transmitter was modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. This input level was established at the frequency of maximum response of the audio modulating circuit.

The Shure Brothers Wireless PSM 700 Transmitter uses the same frequency range as television broadcast monaural transmitters so the test was also run using a 15 kHz input signal modulated by 85% as stated in Part 2.989 e-6.

Paragraph e-5 states that the maximum authorized bandwidth shall be 200 kHz for all emissions inside these frequency bands.

### Carson's Rule:

Section 2.202 (g)

$B_n = 2M_2DK, K=1$        $B_n =$  Bandwidth

$M = 15$  kHz,       $M =$  Maximum Modulating Frequency

$D = 45$  kHz,       $D =$  Peak Deviation

**$B_n = 2(15) + 2(45)(1) = 120$  kHz**

**NOTE:** See the following pages for the graphs of the actual measurements made:



EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

## **GRAPHS TAKEN OF THE OCCUPIED BANDWIDTH**

### **PART 2.989**



## **PSM 700 (PROFESSIONAL STEREO MONITOR ) MODEL P7T**

### **OCCUPIED BANDWIDTH TESTS**

#### **Conditions for the test:**

Set the audio gain pot located on the front of the UUT to the maximum position.

#### **Test procedure:**

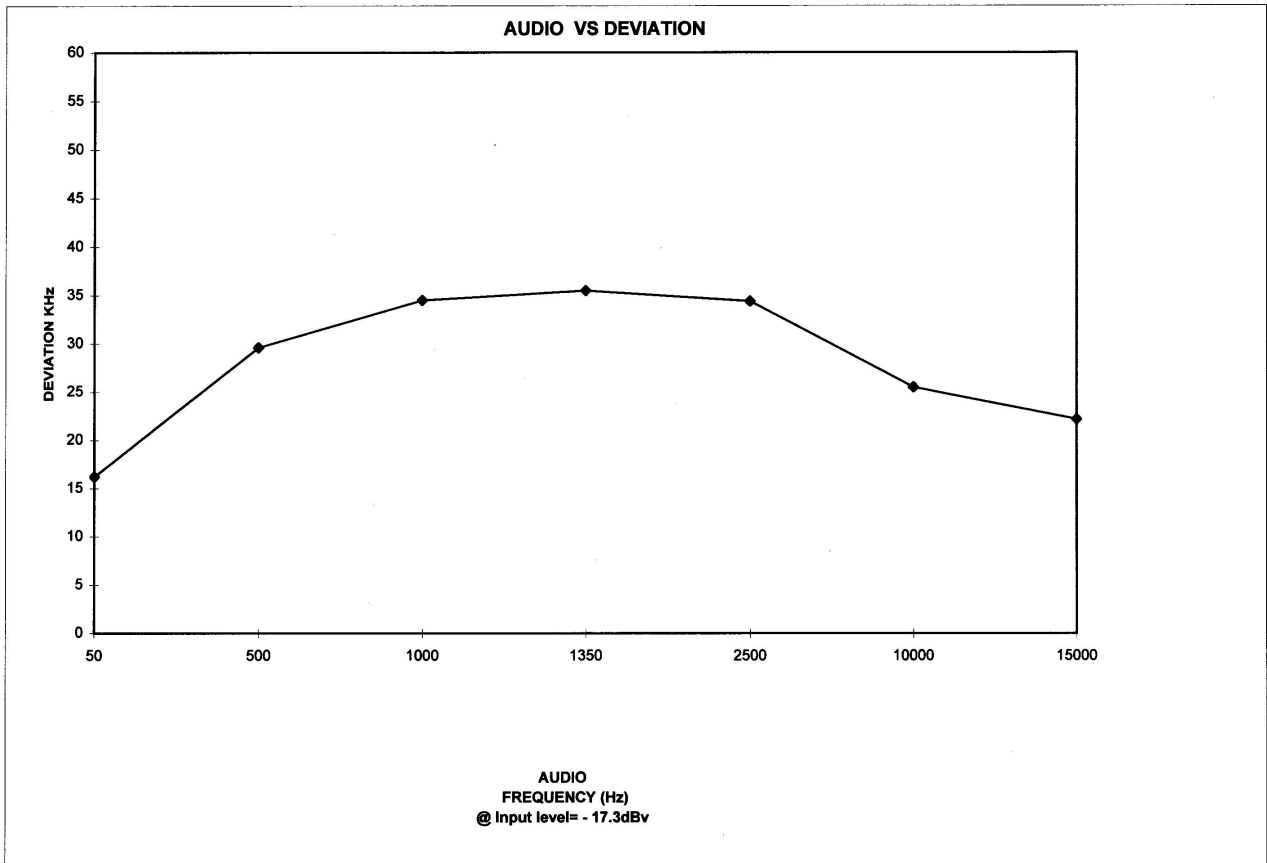
**A)** First we swept the UUT with an audio signal generator to determine what audio frequency causes the greatest deviation, the amplitude of the audio signal was set at a low level of  $-20$  dBv so the limiting circuit is not activated. The frequency that caused the greatest deviation was found to be 1350Hz, then we increased the audio level in order to achieve 50% modulation (In our case is 17.5KHz deviation). The audio level for 50% modulation found to be  $-33.3$  dBv.

**B)** Finally we adjust the audio generator to deliver a 2500Hz tone to the UUT at a level +16dB above the level found above for 50% modulation which is  $-17.3$  dBv. Then we measured the occupied bandwidth and display it.

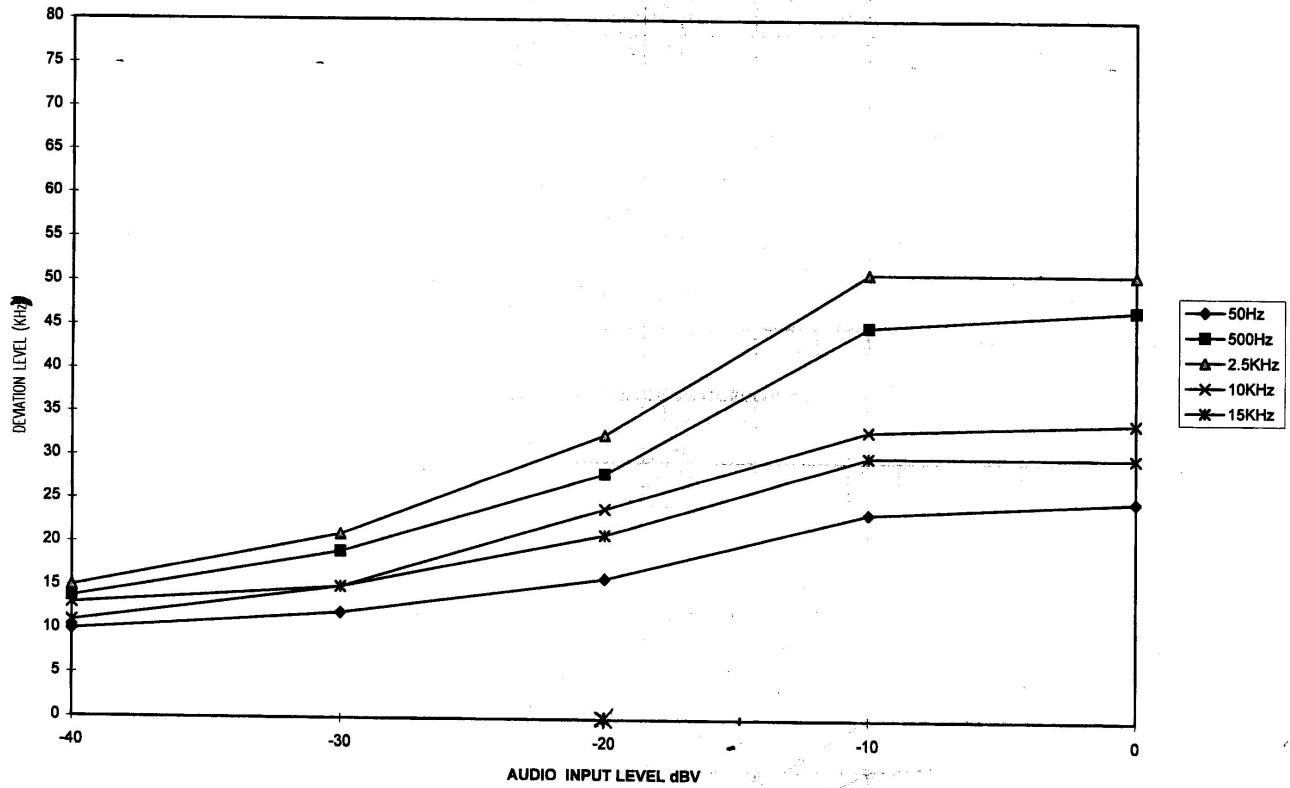
At the same audio level we display the occupied bandwidth for several other frequencies (50Hz, 500Hz, 1000Hz, 10KHz, 15KHz).

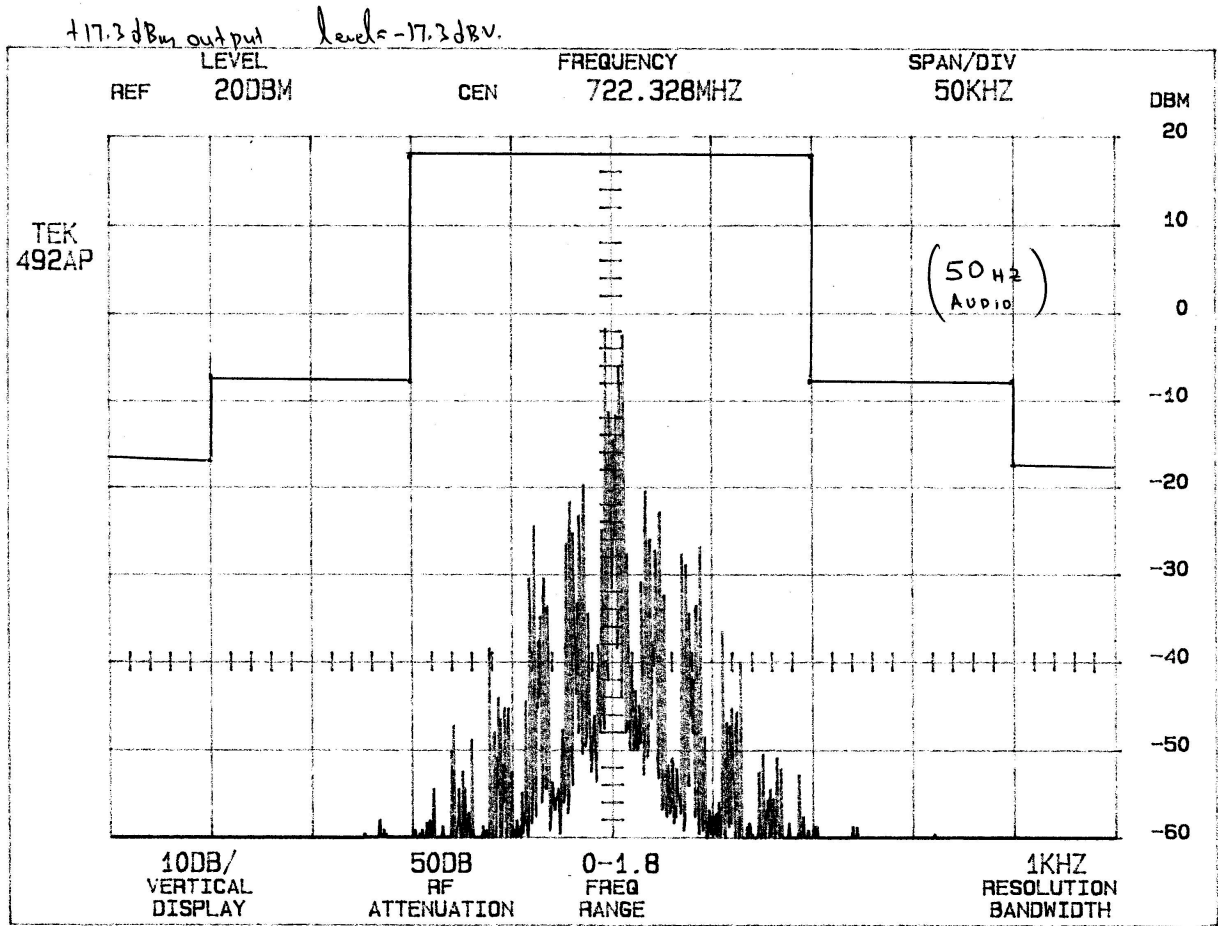
**C)** On separate plot we show the deviation of the UUT versus audio frequencies at a constant input audio level of  $-17.3$  dBv. Also on a separate we display the deviation of the UUT versus different audio input levels of specific frequencies to demonstrate at what audio level the limiting circuitry is activated.

Sheet1 Chart 1

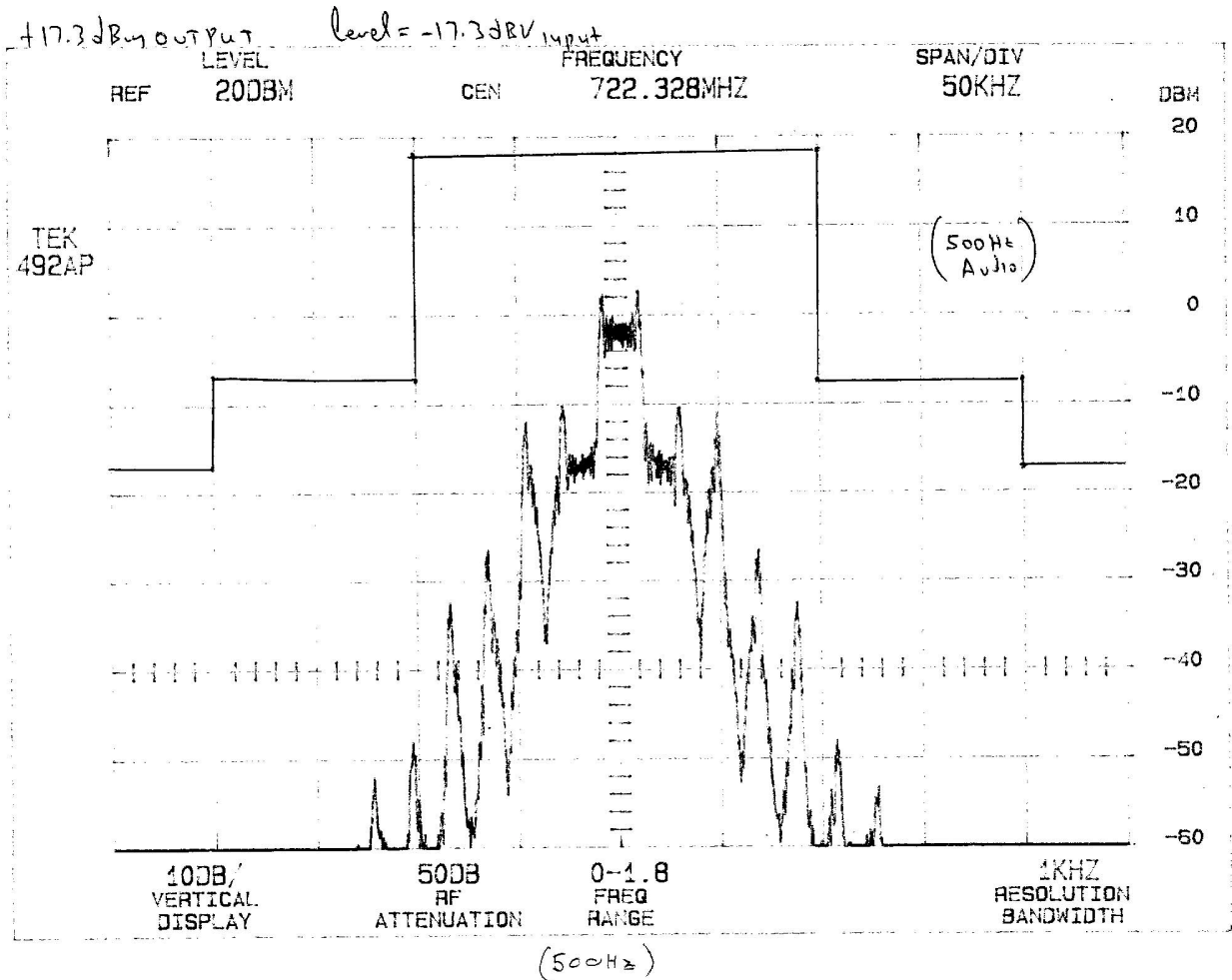


Sheet | Chart 1  
(AUDIO INPUT LEVEL Vs DEVIATION)

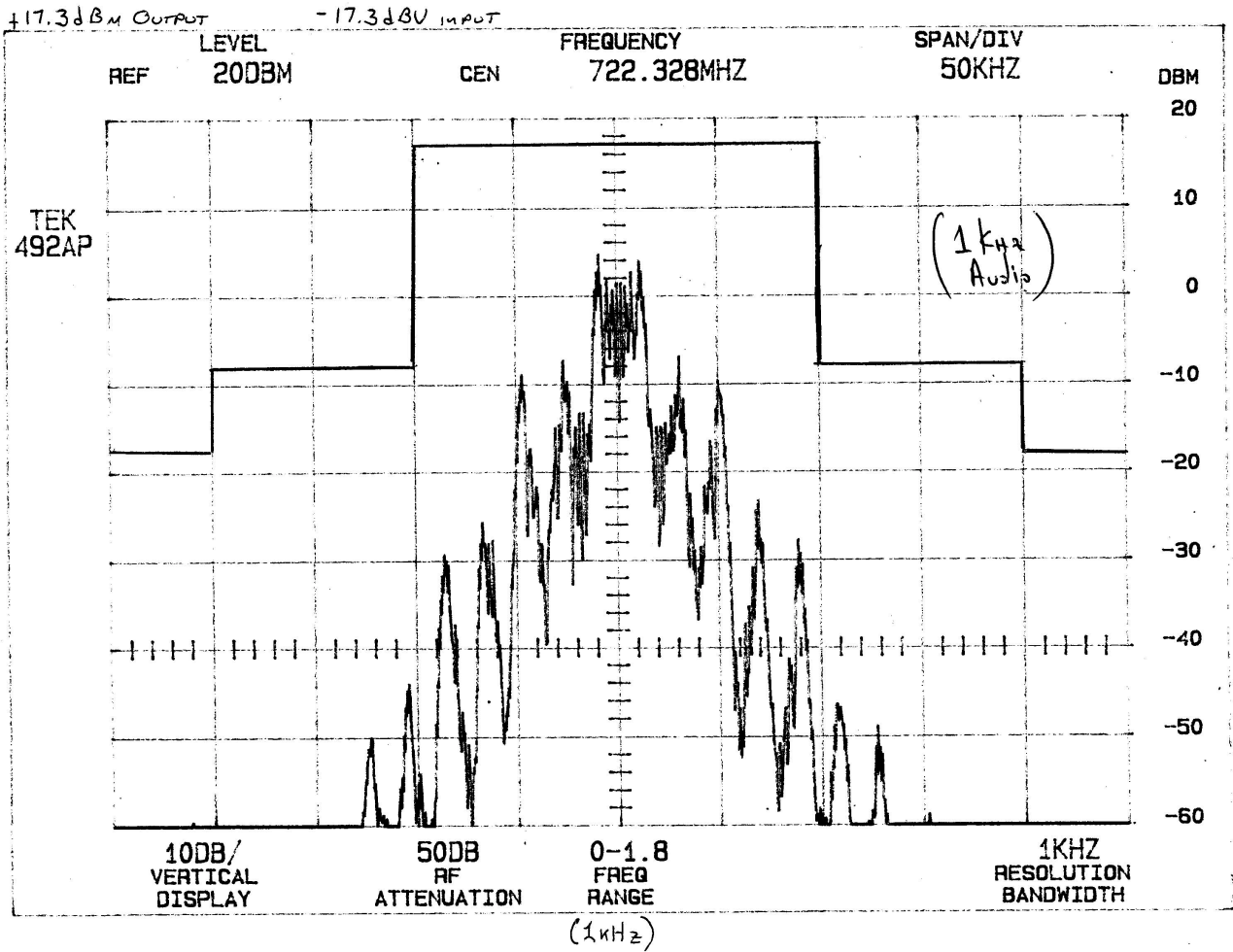


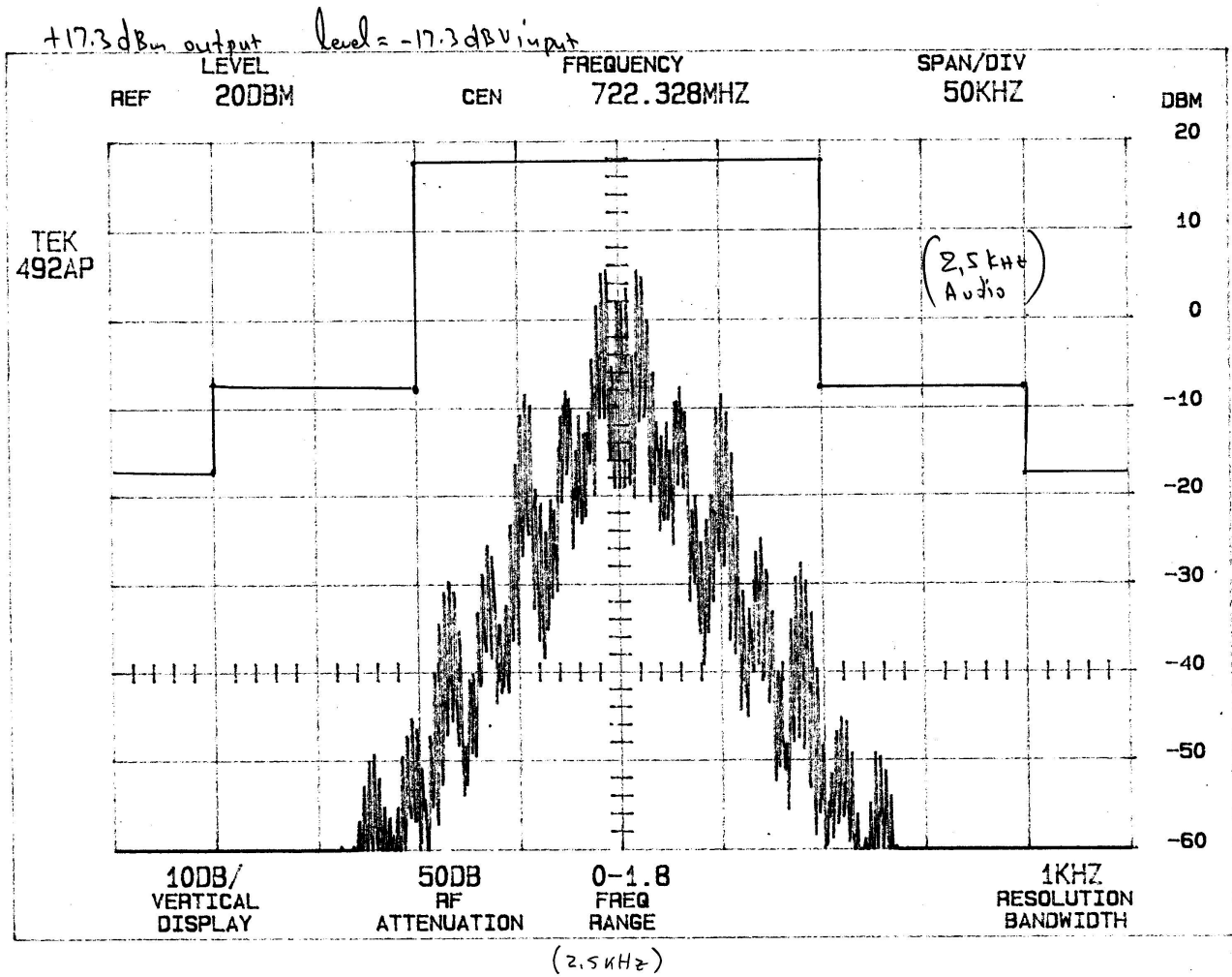


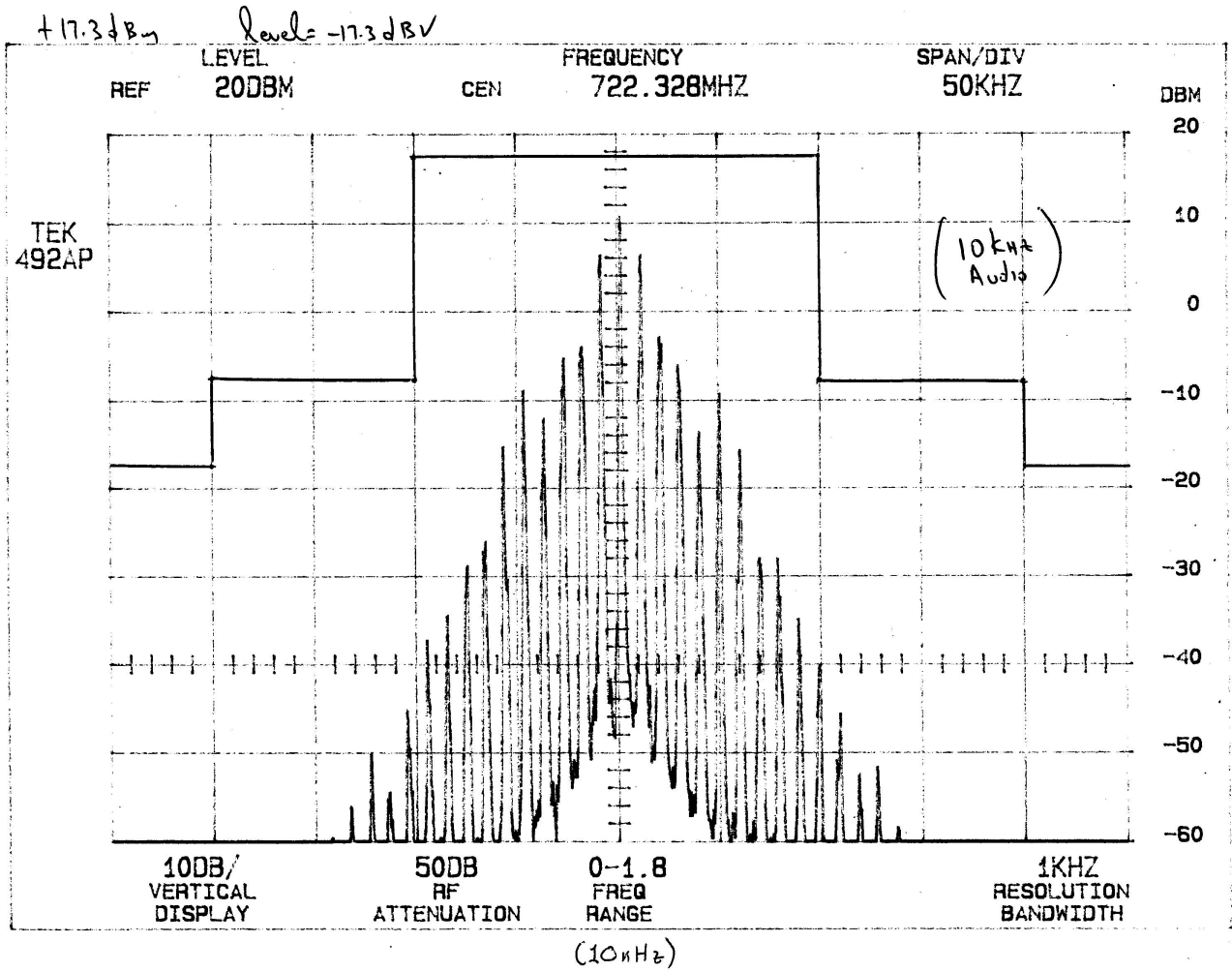
(50 Hz)

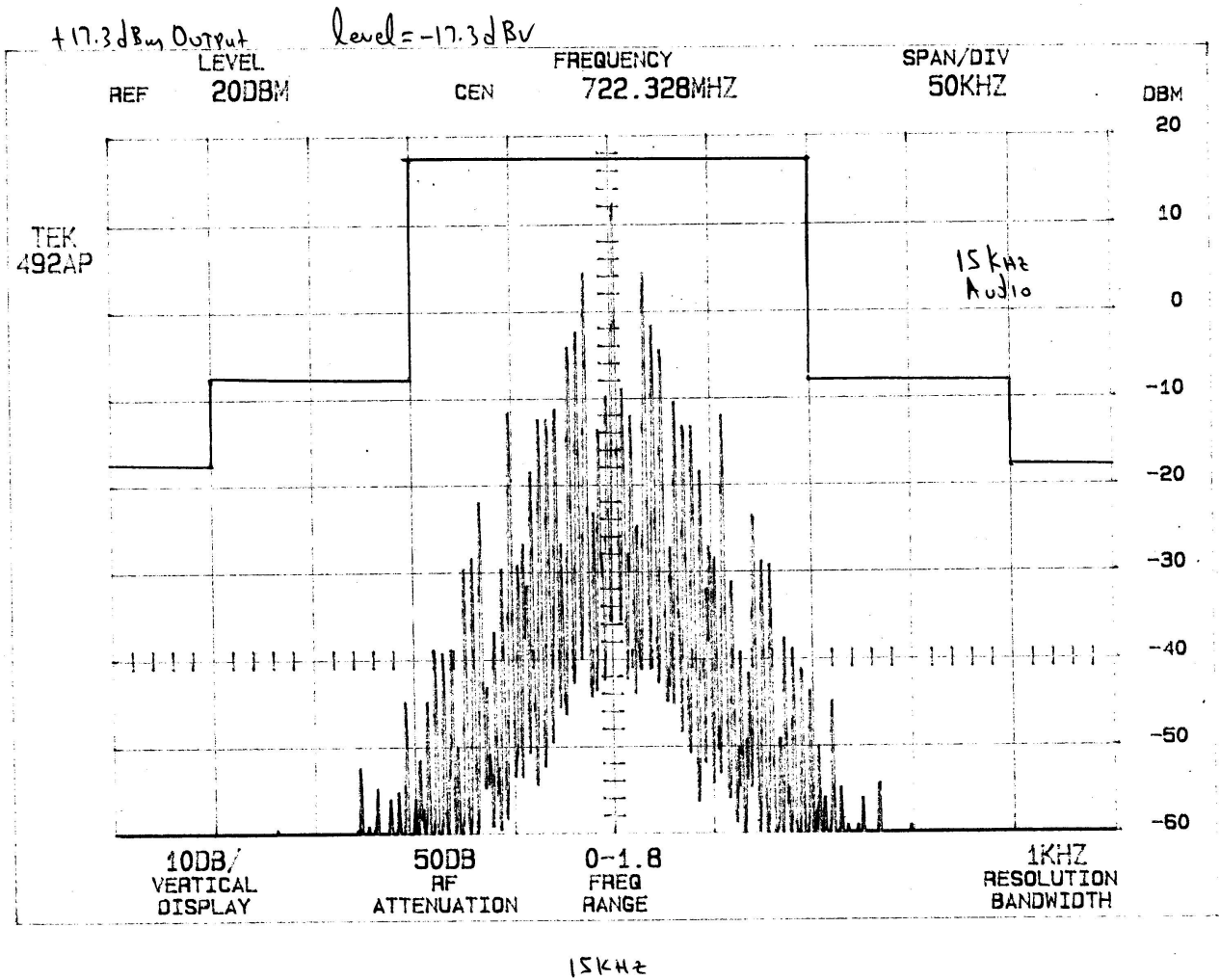














9.0 Frequency Deviation and Tolerance - PART 74.861

Paragraph e-3 states that the maximum authorized deviation shall be 75 kHz for all frequency modulation emissions in the frequency bands 722 to 746 MHz.

Frequency Deviation used: 45 kHz, 100% modulation

Paragraph e-4 states that the frequency tolerance of the transmitter shall be .005 percent.

**NOTE:**

**See the following pages for the graphs of the actual measurements made:**



EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

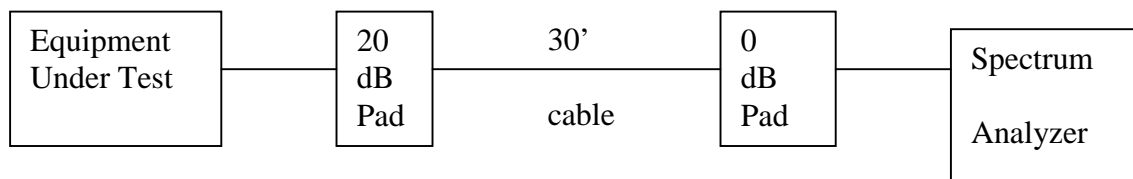
Report No. 6824  
07/10/01

**GRAPHS TAKEN OF THE FREQUENCY DEVIATION  
WITH MODULATION**

**PART 2.989**

## 10.0 SPURIOUS CONDUCTED EMISSION MEASUREMENTS AT ANTENNA TERMINALS PART 2.991

Spurious conducted emissions were measured at the antenna terminals using an artificial load. Plots were made showing the amplitude of each harmonic emissions with the equipment operated as specified in 2.989. As shown by the radiated charts there was no reason to believe that there were any spurious emissions other than the harmonics which were then individually investigated when doing the conducted test at the antenna terminals. Measurements were made up to the 10th Harmonic of the fundamental. The following setup was used showing placement of the attenuators:



The allowed emissions for transmitters operating in the 722 to 746 MHz bands for Shure Brothers Wireless PSM 700 Transmitter equipment are found under Part 74, Section 74.861, Paragraph e-6 for Low Power Auxiliary Stations. This paragraph states the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

- (1) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
- (2) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
- (3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least  $43+10\text{Log}_{10}$  (mean output power in watts) dB.

**NOTE:** See the following pages for the data and graphs of the actual measurements made:



EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

**CONDUCTED EMISSION DATA TAKEN FOR  
SPURIOUS EMISSION MEASUREMENTS MADE  
AT THE ANTENNA TERMINALS**

**PART 2.991**





SUMMARY DATA SHEET OF **OUT-OF-BAND** CONDUCTED EMISSIONS

TEST DATE:----- August 7, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 722.5 MHz**  
 DETECTOR:----- **QUASI-PEAK**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: **MEASUREMENTS MADE AT THE ANTENNA TERMINALS**

**THE FOLLOWING ARE SIGNIFICANT CONDUCTED LEVELS FOUND:**

FREQ IN MHz.	PAD & CABLE		LIMIT dB	MARGIN dB
	TOTAL dBuV	LOSSES USED		
1445.00	50.10	22.30	71.70	21.60
4352.00	40.60	25.20	68.80	28.20
6750.00	46.60	27.40	66.60	20.00



SUMMARY DATA SHEET OF **OUT-OF-BAND** CONDUCTED EMISSIONS

TEST DATE:----- August 7, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 736.5 MHz**  
 DETECTOR:----- **QUASI-PEAK**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: **MEASUREMENTS MADE AT THE ANTENNA TERMINALS**

**THE FOLLOWING ARE SIGNIFICANT CONDUCTED LEVELS FOUND:**

FREQ IN MHz.	PAD & CABLE		LIMIT dB	MARGIN dB
	TOTAL dBuV	LOSSES USED		
1472.00	48.00	22.30	71.70	23.70
4455.00	40.40	25.20	68.80	28.40
5831.00	45.90	27.40	66.60	20.70



SUMMARY DATA SHEET OF **OUT-OF-BAND** CONDUCTED EMISSIONS

TEST DATE:----- August 7, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 745.5 MHz**  
 DETECTOR:----- **QUASI-PEAK**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*LOW POWER AUXILIARY STATIONS\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: **MEASUREMENTS MADE AT THE ANTENNA TERMINALS**

**THE FOLLOWING ARE SIGNIFICANT CONDUCTED LEVELS FOUND:**

FREQ IN MHz.	PAD & CABLE			LIMIT dB	MARGIN dB
	TOTAL dBuV	LOSSES USED			
1492.00	48.60	22.30		71.70	23.10
4949.00	40.80	25.20		68.80	28.00
6636.00	46.70	27.40		66.60	19.90

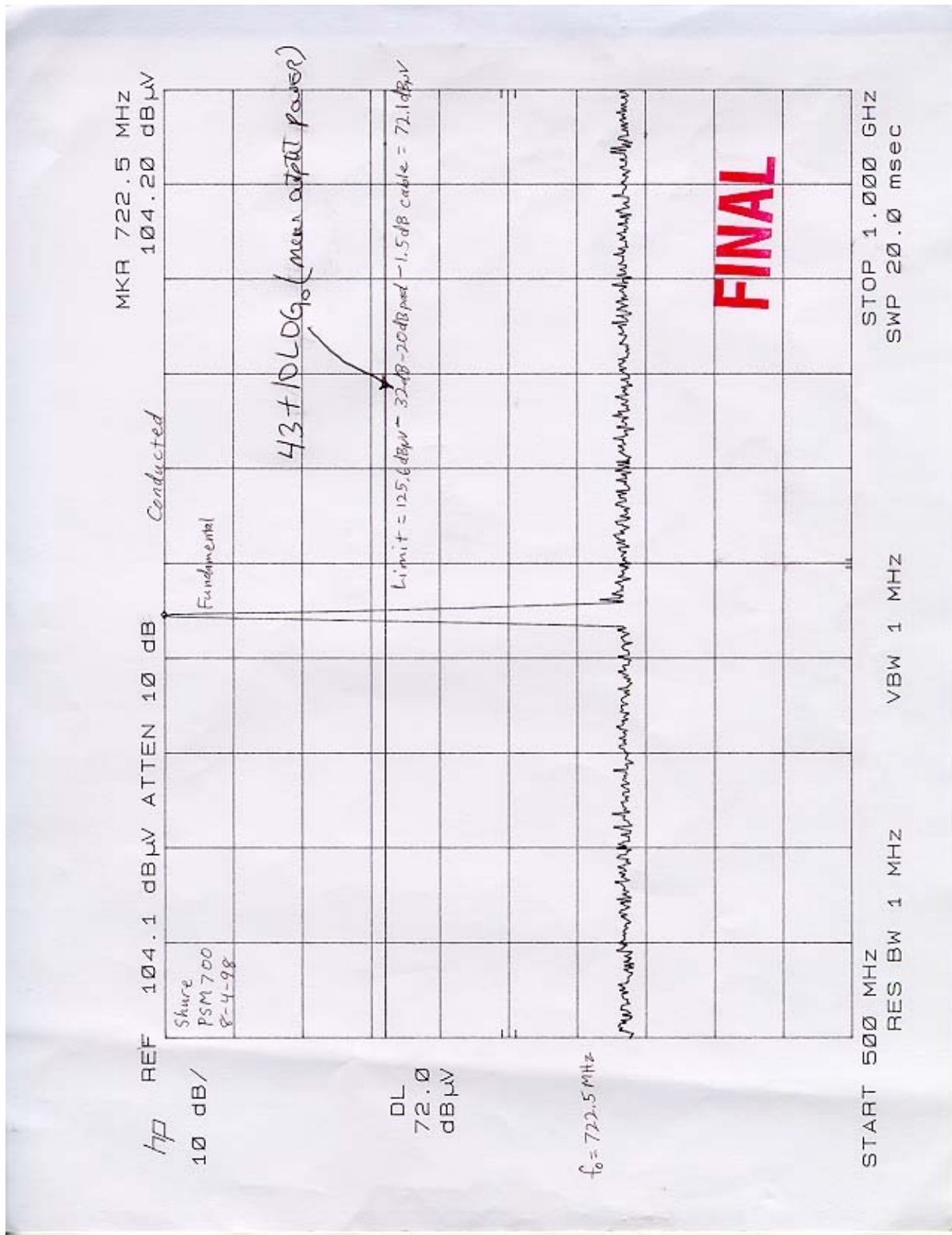


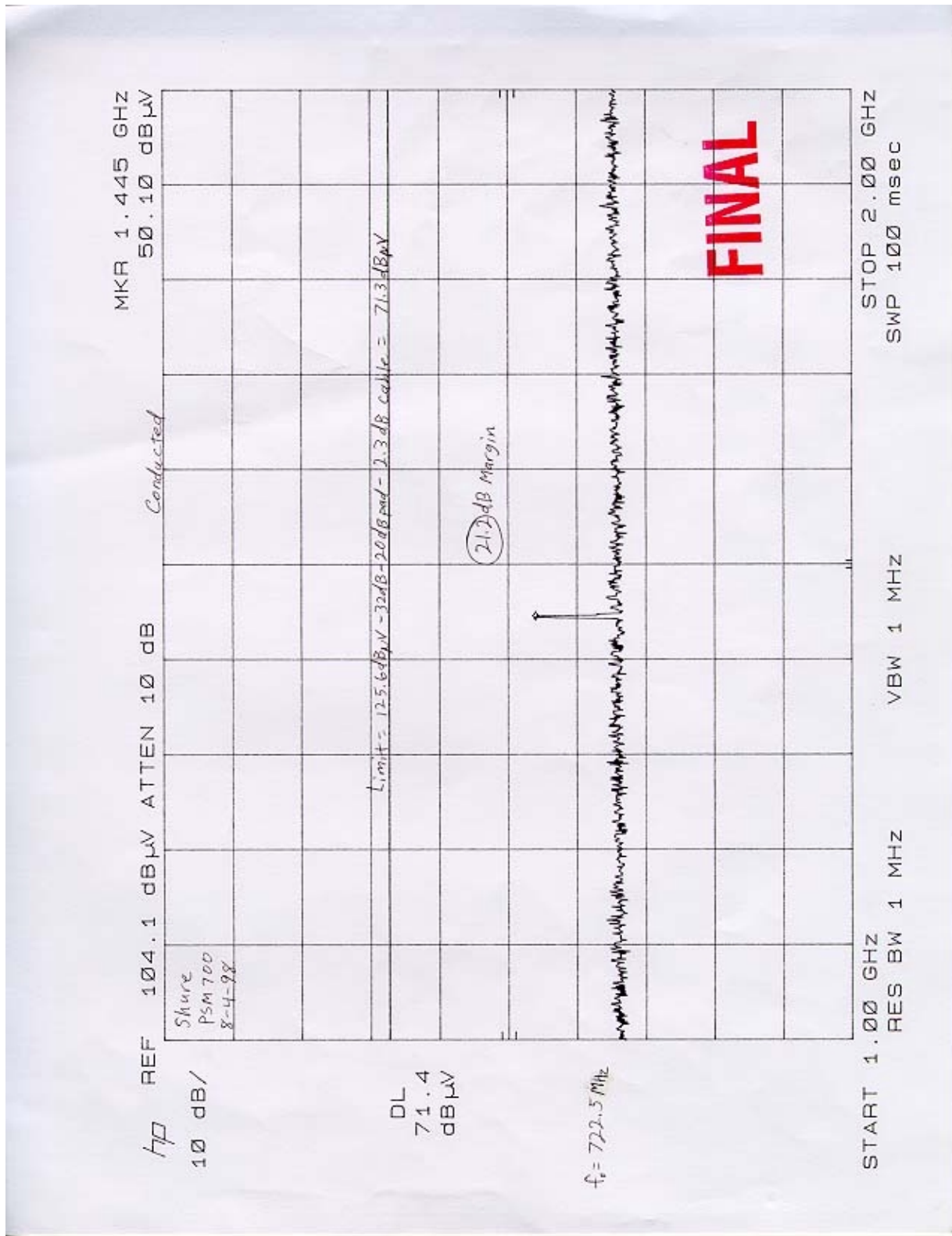
EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

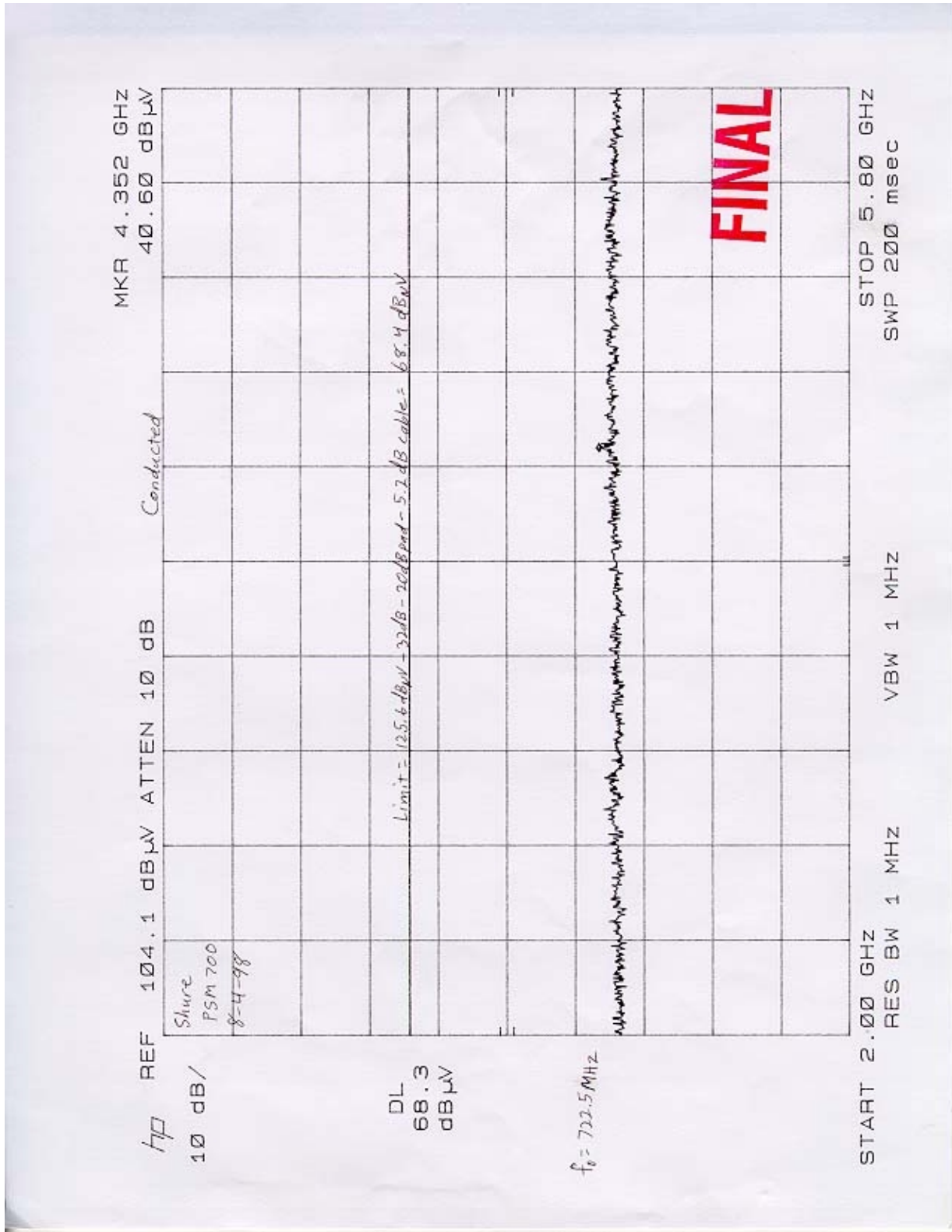
Report No. 6824  
07/10/01

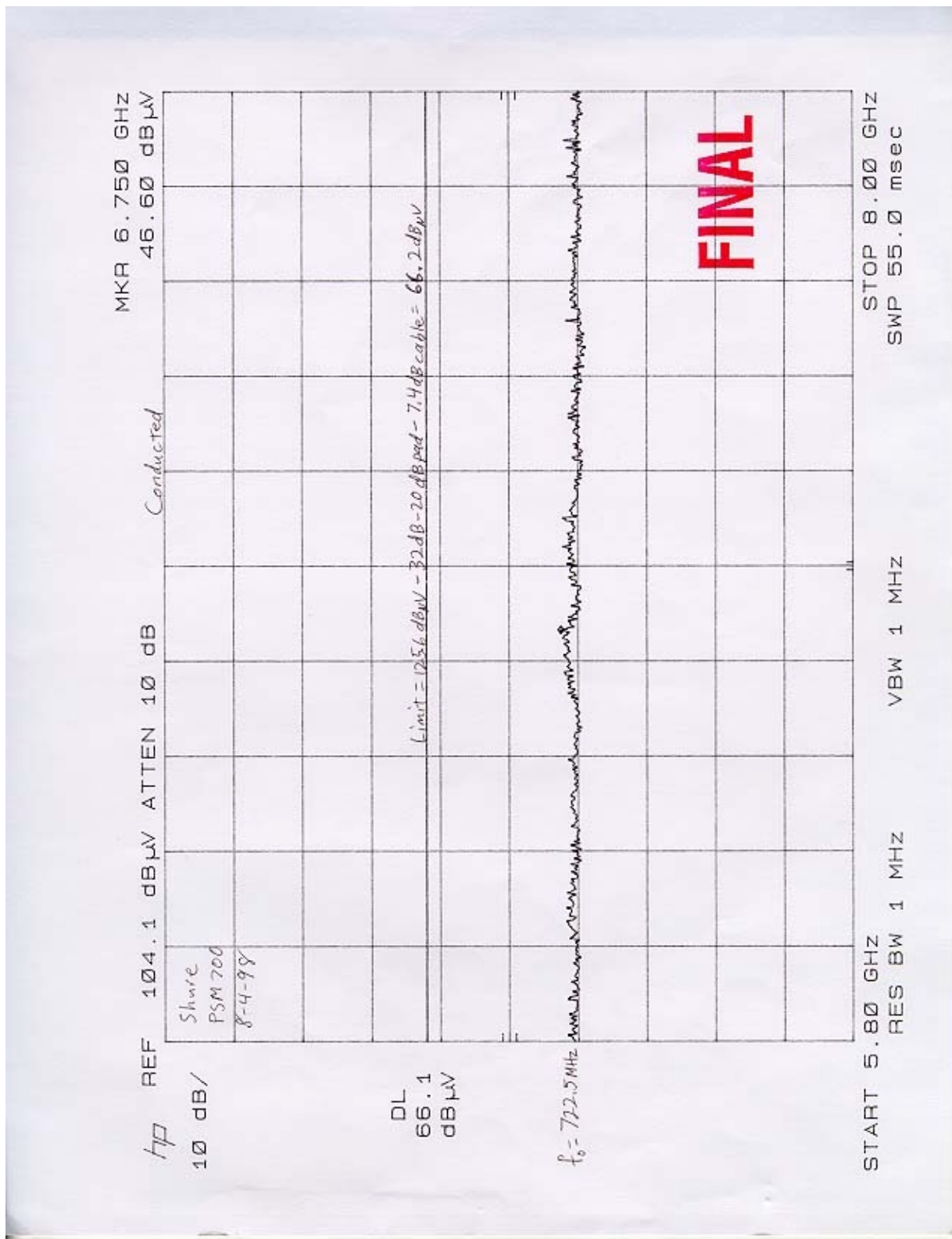
**CONDUCTED EMISSION GRAPHS TAKEN FOR  
SPURIOUS EMISSION MEASUREMENTS MADE  
AT THE ANTENNA TERMINALS**

**PART 2.991**

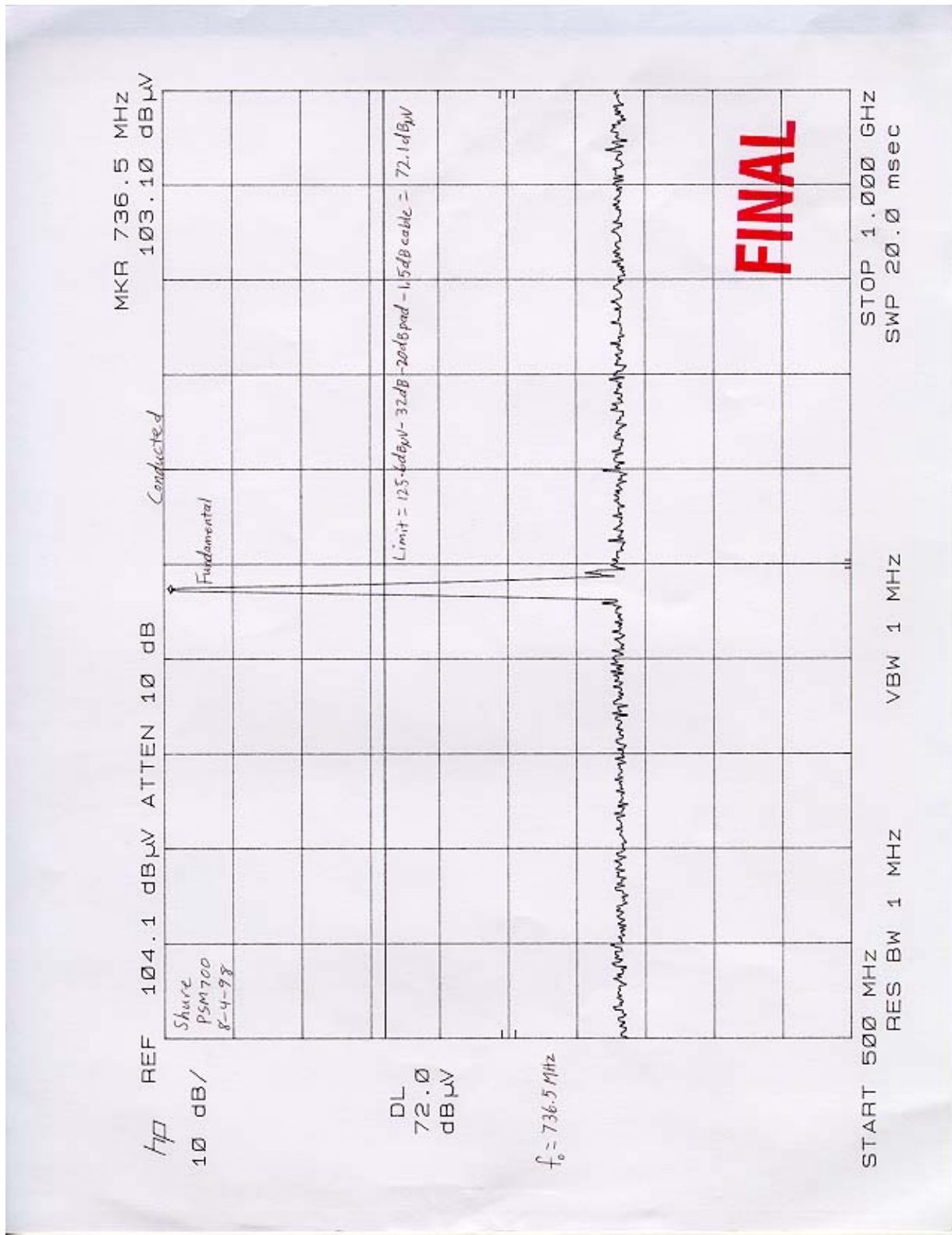


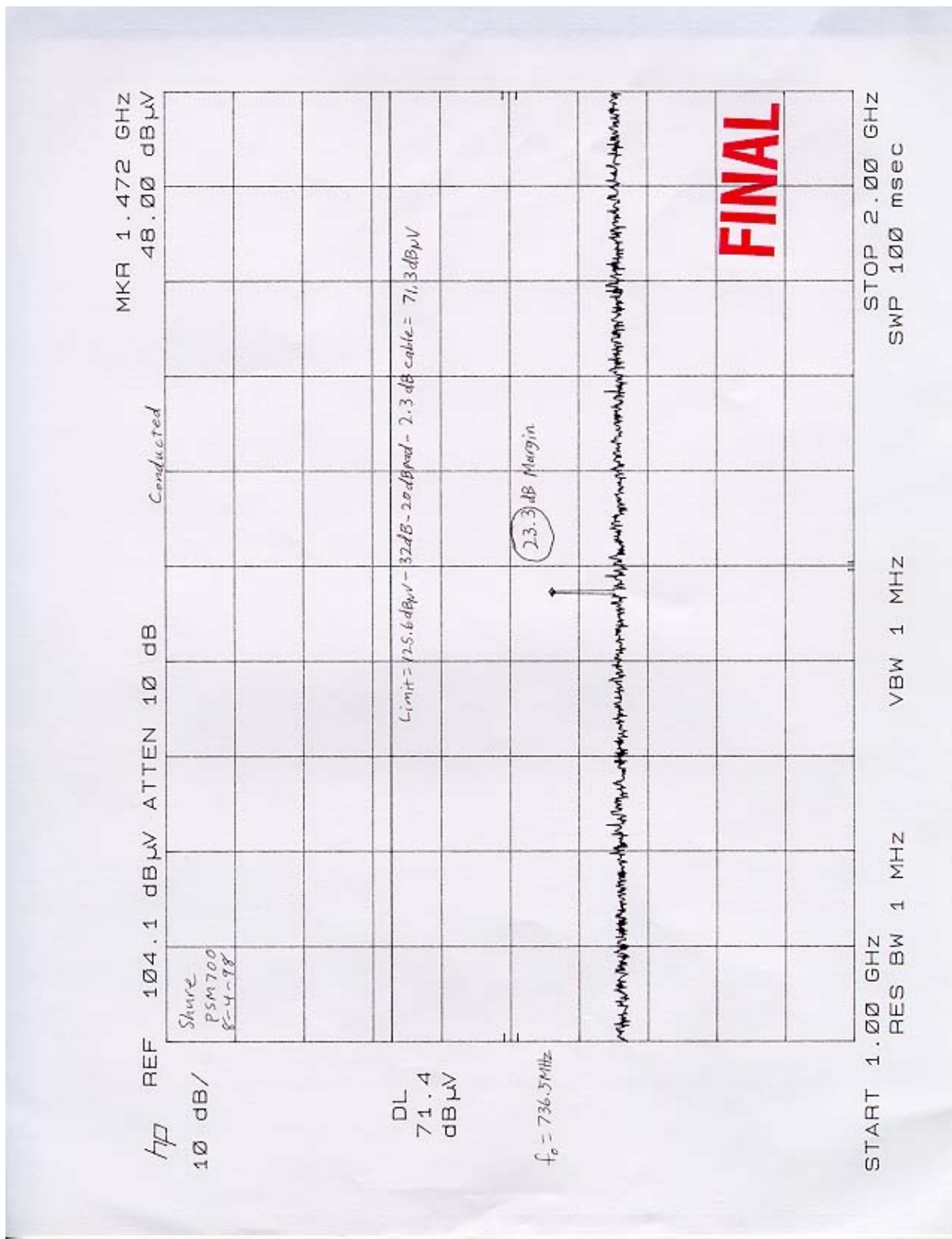


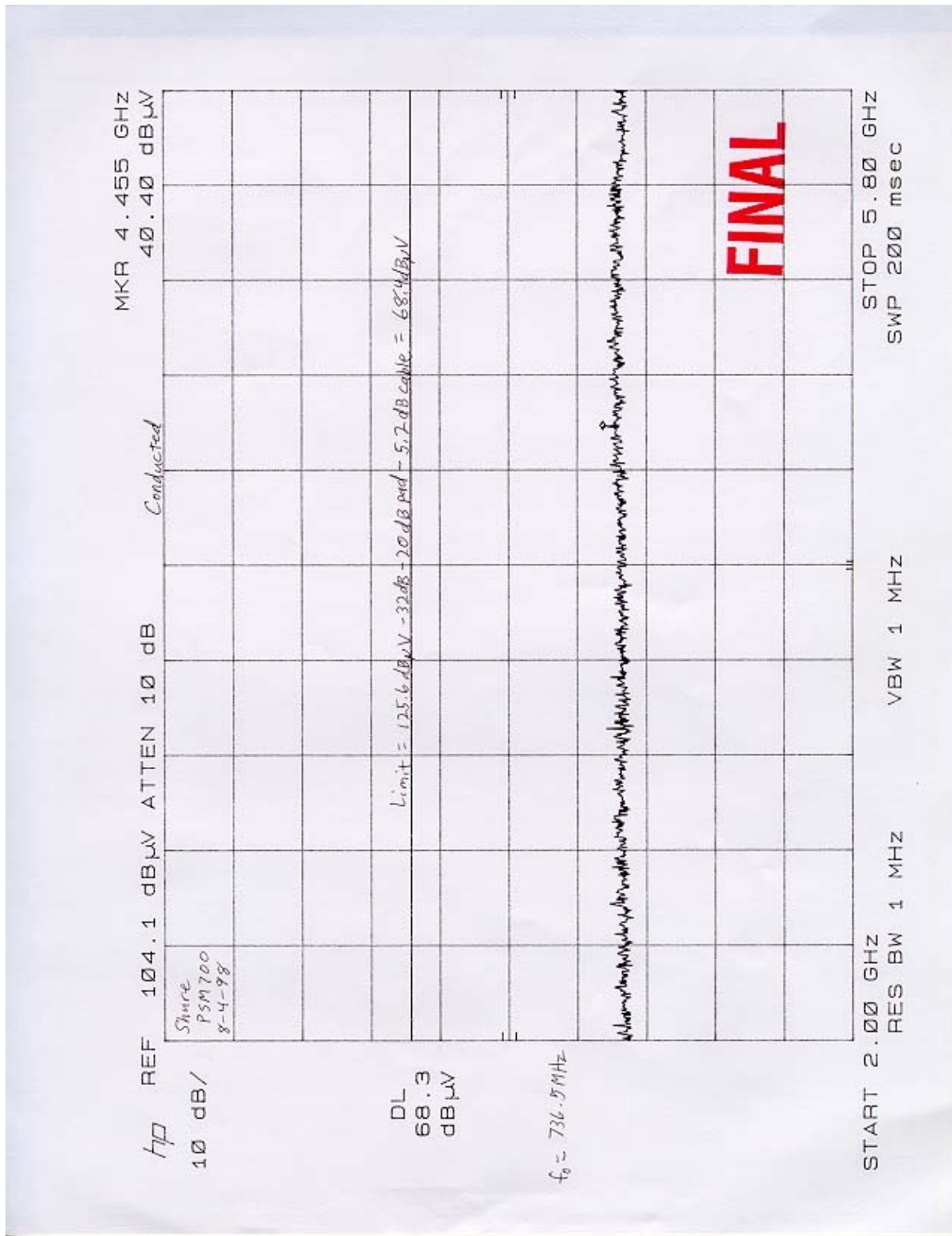


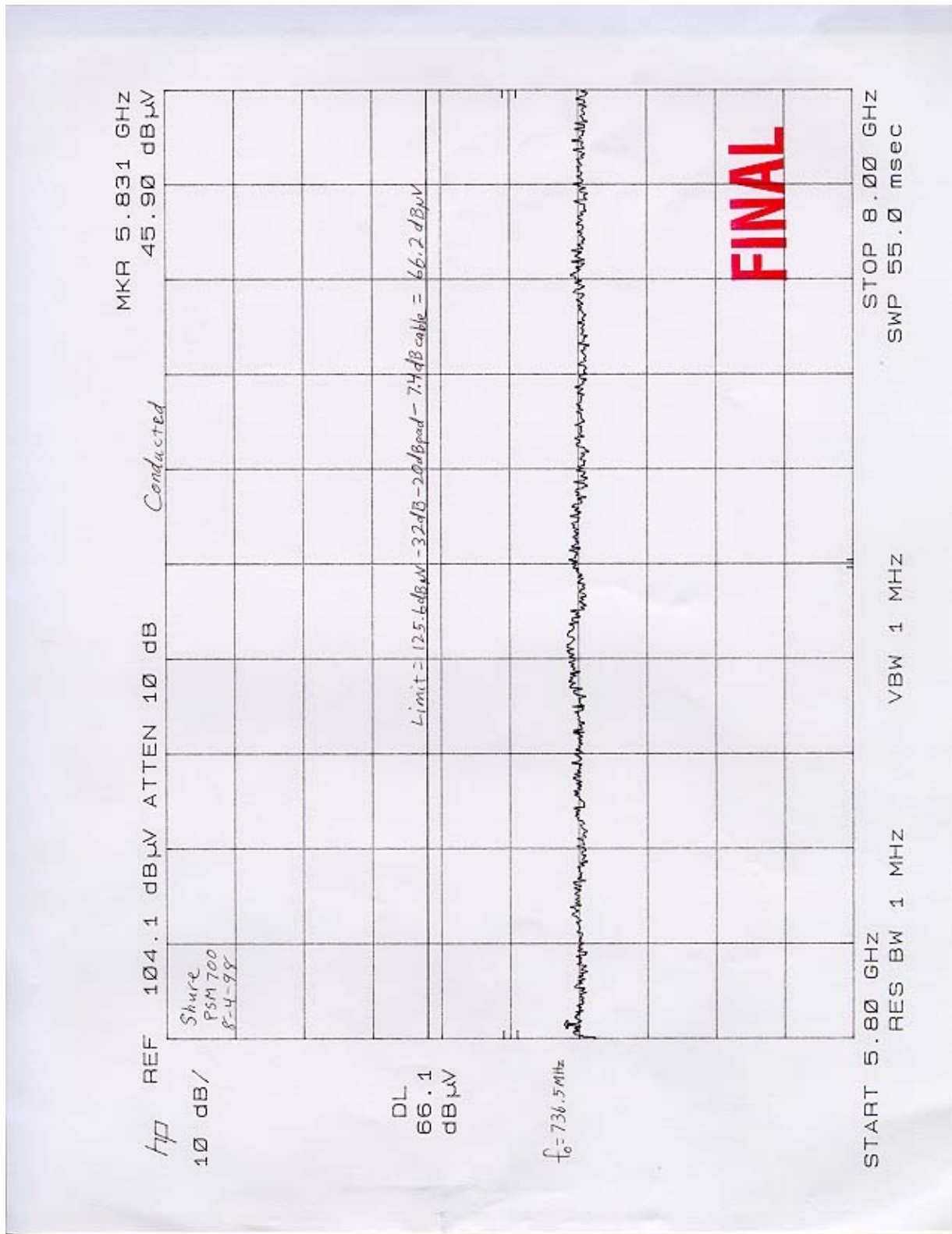




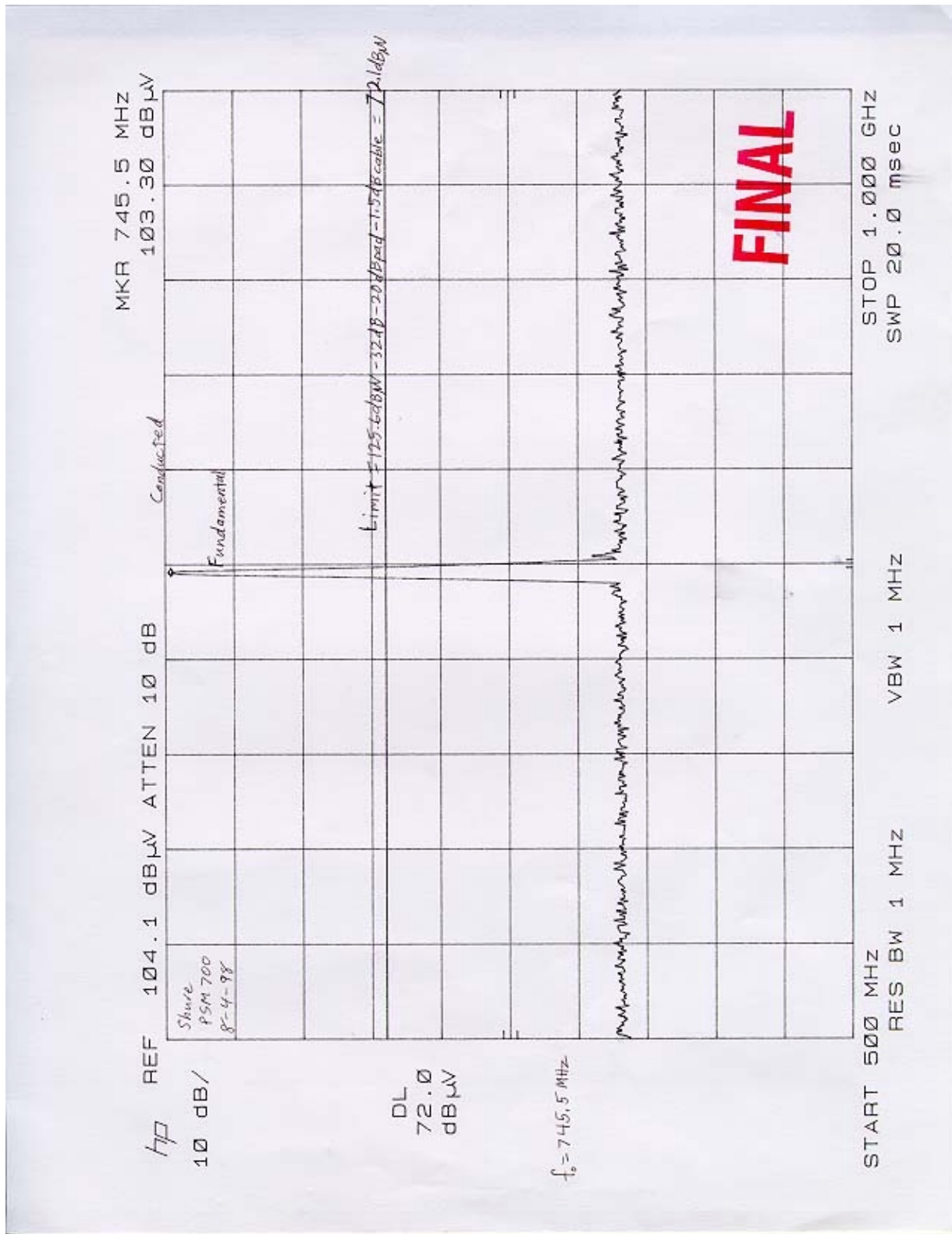


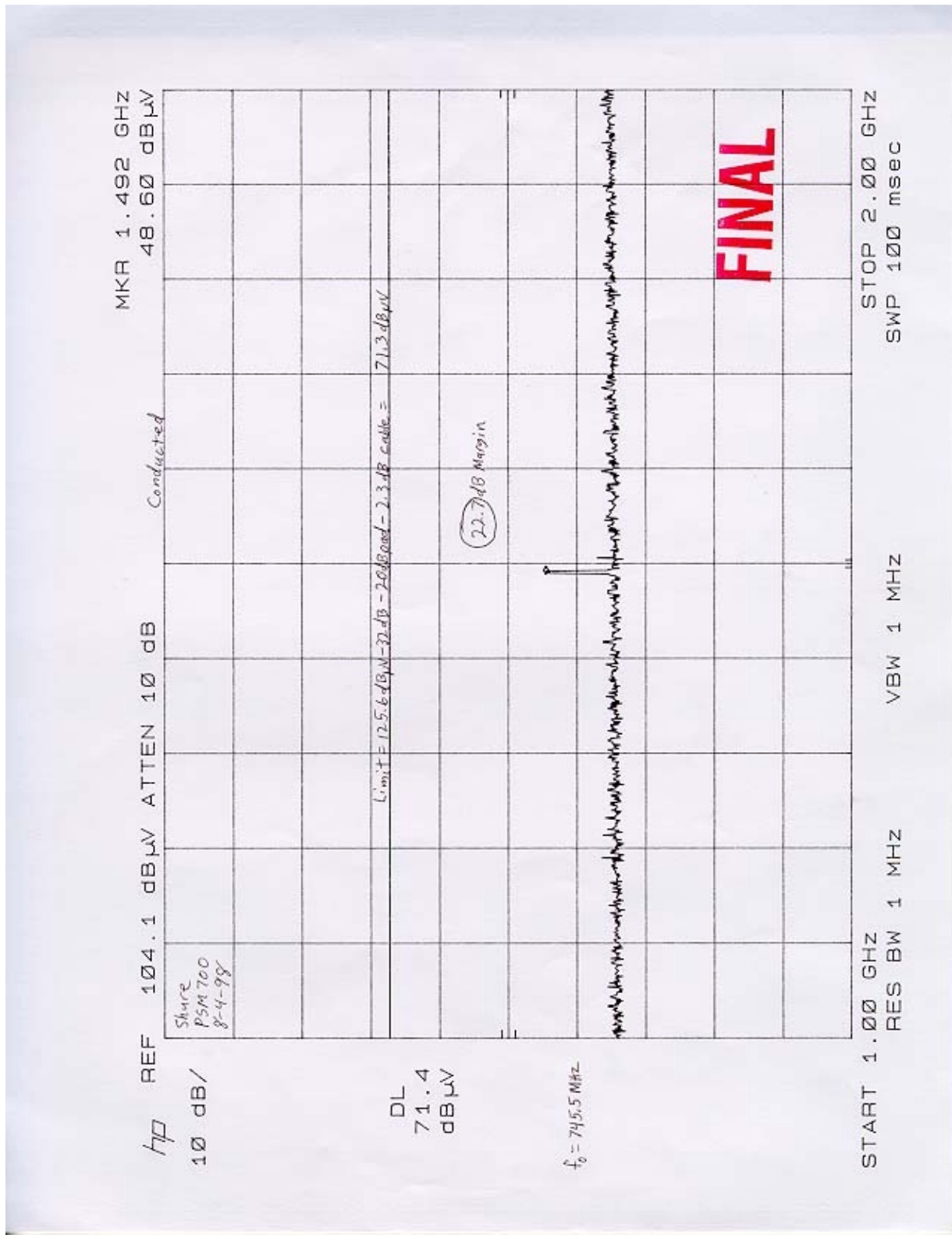


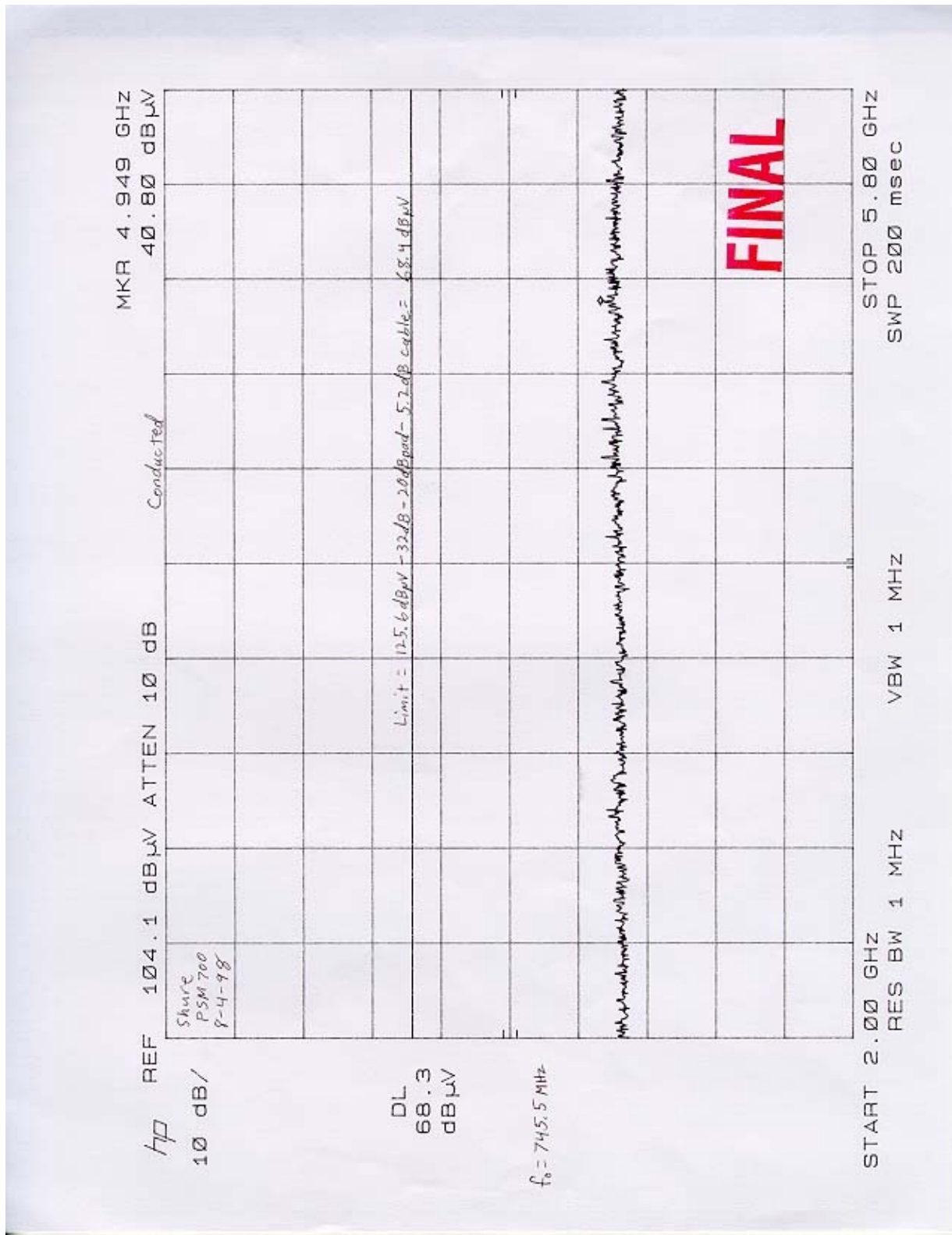


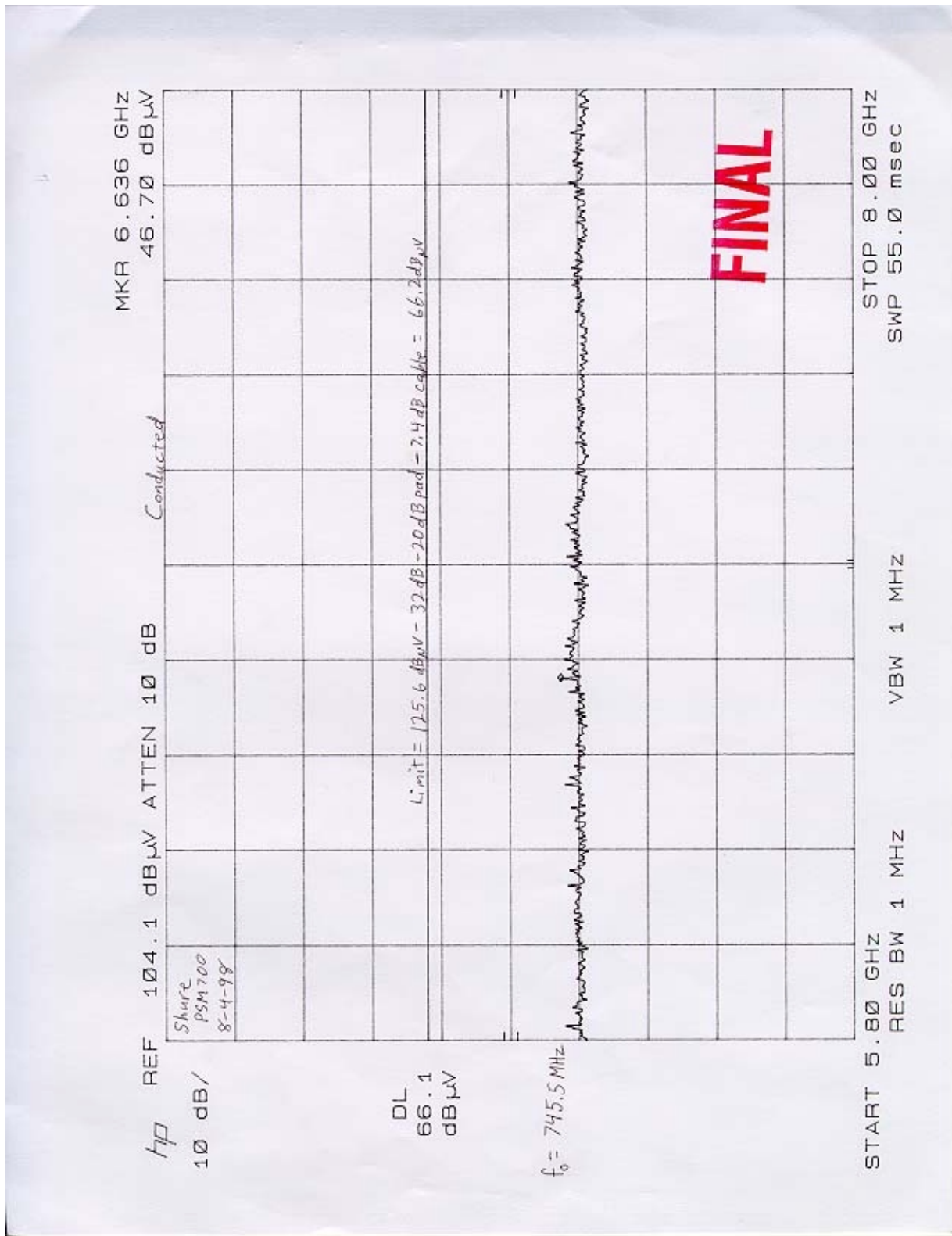
















## 11.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS PART 2.993

Radiated measurements were performed at a 1 or 3 meter test distance automatically scanning the frequency range from 200 MHz to 8000 MHz, depending upon the fundamental frequency.

For the Shure Brothers Wireless PSM 700 Transmitter, the highest fundamental frequency is 746 MHz so the scans were made up to 8000 MHz, to cover the tenth harmonic.

All signals in the frequency range of 30 MHz to 200 MHz were measured with a Biconical Antenna and from 200 MHz to 1000 MHz a Log Periodic Antenna was used as the pickup devices. From 1000 MHz to 10000 MHz, a Double Ridge Horn Antenna was used. The cables and equipment were placed and moved within the range of positions likely to find their maximum emissions. Tests were made in both the horizontal and vertical planes of polarization.

The allowed emissions for transmitters operating in the 722 to 746 MHz bands for Shure Brothers Wireless PSM 700 Transmitter equipment are found under Part 74, Section 74.861, Paragraph e-6 for Low Power Auxiliary Stations. This paragraph states the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

- (1) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
- (2) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
- (3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least  $43 + 10 \log_{10}$  (mean output power in watts) dB.



## 11.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T) PART 2.993

To determine the limit for all spurious & harmonic emissions, the following method was used:

LIMIT for Spurious Emissions:

As stated in Part 74, Section 74.861 (e-1 ii) the limit is 250 mW in the frequency range 614 to 806 MHz.

$$43 + 10 * \text{LOG}_{10}(0.25 \text{ watts}) = 36.98 \text{ dB}$$

55.21dBm extrapolated level for 0.1 watts

-36.98 dB required reduction below the unmodulated fundamental

**18.23 dBm or 125.23 dBuV/m at 1 meter** maximum spurious emissions allowed

**Extrapolating the level to 3 meters:**

$$125.23 \text{ dBuV/m} - 9.54 \text{ dB} = \mathbf{115.69 \text{ dBuV/m at 3 meters}}$$

**NOTE:**

**See the following data and graphs for actual measurements made:**



EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

## **RADIATED DATA TAKEN FOR FIELD STRENGTH**

### **SPURIOUS EMISSION MEASUREMENTS**

#### **PART 2.993**



SUMMARY DATA SHEET OF **RADIATED EMISSIONS >1000 MHz**

TEST DATE:----- August 4, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 722.5 MHz**  
 RATED POWER:----- **0.1000**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: RADIATED EMISSIONS USING **VERTICAL** POLARIZATION

**THE FOLLOWING ARE THE HIGHEST NOISE FLOOR READINGS TAKEN:**

FREQ IN MHz.	METER READING dBuV	ANTENNA PLUS CABLE	PRE-AMP GAIN dB	TOTAL dBuV	ANTENNA DISTANCE IN METERS	LIMIT dBuV	MARGIN dB
1636.00	32.10	29.82	0.00	61.92	3	<b>84.46</b>	22.54
4926.00	31.80	39.81	0.00	71.61	1	<b>94.00</b>	22.39
6717.00	32.70	42.01	0.00	74.71	1	<b>94.00</b>	19.29



SUMMARY DATA SHEET OF **RADIATED EMISSIONS >1000 MHz**

TEST DATE:----- August 4, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 722.5 MHz**  
 RATED POWER:----- **0.1000**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: RADIATED EMISSIONS USING **HORIZONTAL POLARIZATION**

**THE FOLLOWING ARE THE HIGHEST NOISE FLOOR READINGS TAKEN:**

FREQ IN MHz.	METER READING dBuV	ANTENNA PLUS CABLE	PRE-AMP GAIN dB	TOTAL dBuV	ANTENNA DISTANCE IN METERS	LIMIT dBuV	MARGIN dB
1636.00	32.10	29.82	0.00	61.92	3	<b>84.46</b>	22.54
4926.00	31.80	39.81	0.00	71.61	1	<b>94.00</b>	22.39
6717.00	32.70	42.01	0.00	74.71	1	<b>94.00</b>	19.29



**SUMMARY DATA SHEET OF RADIATED EMISSIONS >1000 MHz**

TEST DATE:----- August 4, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 736.5 MHz**  
 RATED POWER:----- **0.1000**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: RADIATED EMISSIONS USING **VERTICAL** POLARIZATION

**THE FOLLOWING ARE THE HIGHEST NOISE FLOOR READINGS TAKEN:**

FREQ IN MHz.	METER READING dBuV	ANTENNA PLUS CABLE	PRE-AMP GAIN dB	TOTAL dBuV	ANTENNA DISTANCE IN METERS	LIMIT dBuV	MARGIN dB
1673.00	31.90	29.82	0.00	61.72	3	<b>84.46</b>	22.74
5059.00	31.90	40.10	0.00	72.00	1	<b>94.00</b>	22.00
6698.00	32.10	42.01	0.00	74.11	1	<b>94.00</b>	19.89



SUMMARY DATA SHEET OF **RADIATED EMISSIONS >1000 MHz**

TEST DATE:----- August 4, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 736.5 MHz**  
 RATED POWER:----- **0.1000**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: RADIATED EMISSIONS USING **HORIZONTAL** POLARIZATION

**THE FOLLOWING ARE THE HIGHEST NOISE FLOOR READINGS TAKEN:**

FREQ IN MHz.	METER READING dBuV	ANTENNA PLUS CABLE	PRE-AMP GAIN dB	TOTAL dBuV	ANTENNA DISTANCE IN METERS	LIMIT dBuV	MARGIN dB
1673.00	31.90	29.82	0.00	61.72	3.00000	<b>84.46</b>	22.74
5059.00	31.90	40.10	0.00	72.00	1.00000	<b>94.00</b>	22.00
6698.00	32.10	42.01	0.00	74.11	1.00000	<b>94.00</b>	19.89



**SUMMARY DATA SHEET OF RADIATED EMISSIONS >1000 MHz**

TEST DATE:----- August 4, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 745.5 MHz**  
 RATED POWER:----- **0.1000**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: RADIATED EMISSIONS USING **VERTICAL** POLARIZATION

**THE FOLLOWING ARE THE HIGHEST NOISE FLOOR READINGS TAKEN:**

FREQ IN MHz.	METER READING dBuV	ANTENNA PLUS CABLE	PRE-AMP GAIN dB	TOTAL dBuV	ANTENNA DISTANCE IN METERS	LIMIT dBuV	MARGIN dB
1475.00	31.70	29.10	0.00	60.80	3	<b>84.46</b>	23.66
4497.00	31.90	38.62	0.00	70.52	1	<b>94.00</b>	23.48
7553.00	32.20	45.10	0.00	77.30	1	<b>94.00</b>	16.70





**SUMMARY DATA SHEET OF RADIATED EMISSIONS >1000 MHz**

TEST DATE:----- August 4, 1998  
 MANUFACTURER:----- Shure Brothers Incorporated  
 MODEL NO:----- P7T  
 S/N:----- NA  
 CONFIGURATION:----- **Fundamental Frequency set at 745.5 MHz**  
 RATED POWER:----- **0.1000**

TEST SPECIFICATION: FCC "RULES AND REGULATION", PART 74  
 SUBPART H / SECTION 74.861

**\*\*\*\*LOW POWER AUXILIARY STATIONS\*\*\*\***

TEST EQUIPMENT: Spectrum Analyzer ----- HP 8566B  
 Quasi Peak Adapter ----- HP 85650A

TYPE OF TEST: RADIATED EMISSIONS USING **HORIZONTAL** POLARIZATION

**THE FOLLOWING ARE THE HIGHEST NOISE FLOOR READINGS TAKEN:**

FREQ IN MHz.	METER READING dBuV	ANTENNA PLUS CABLE	PRE-AMP GAIN dB	TOTAL dBuV	ANTENNA DISTANCE IN METERS	LIMIT dBuV	MARGIN dB
1475.00	31.70	29.10	0.00	60.80	3	<b>84.46</b>	23.66
4497.00	31.90	38.62	0.00	70.52	1	<b>94.00</b>	23.48
7553.00	32.20	45.10	0.00	77.30	1	<b>94.00</b>	16.70



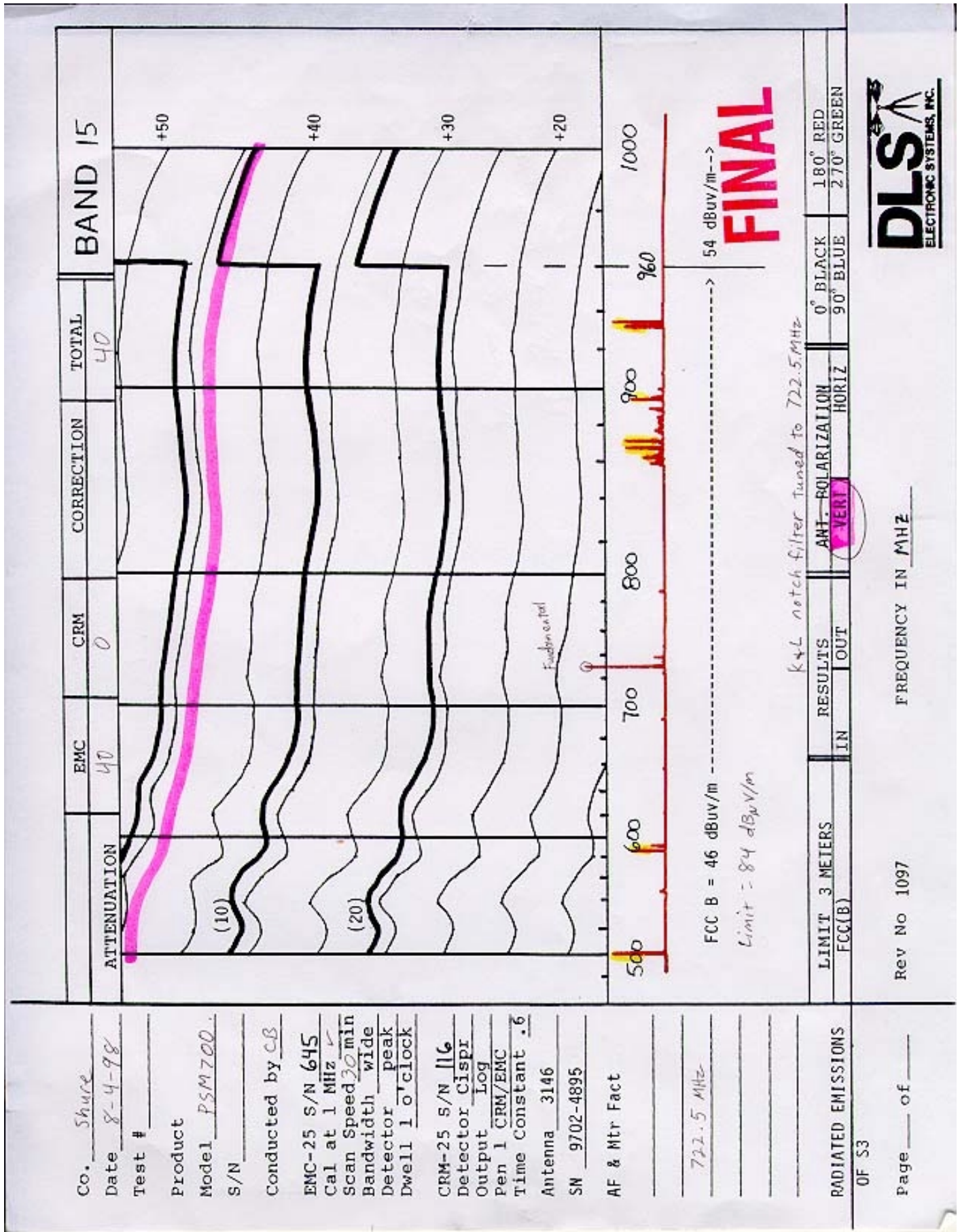
EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

## **RADIATED GRAPHS TAKEN FOR FIELD STRENGTH**

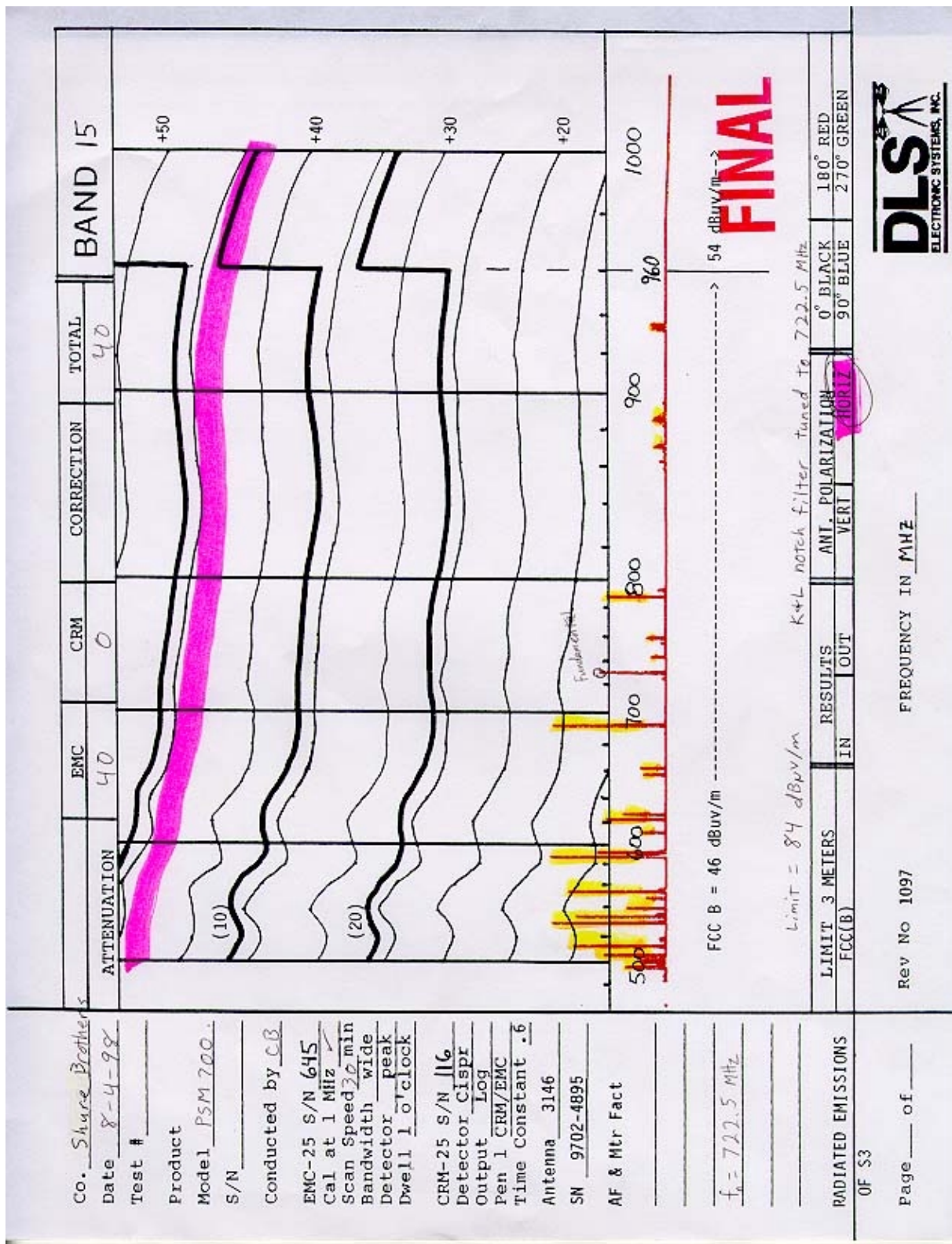
### **SPURIOUS EMISSION MEASUREMENTS**

#### **PART 2.993**



Co. Shure  
Date 8-4-98  
Test # \_\_\_\_\_  
Product \_\_\_\_\_  
Model PSM700  
S/N \_\_\_\_\_  
Conducted by CB  
EMC-25 S/N 645  
Cal at 1 MHz ✓  
Scan Speed 30 min  
Bandwidth wide  
Detector peak  
Dwell 1 o'clock  
CRM-25 S/N 116  
Detector Cispr  
Output Log  
Pen 1 CRM/EMC  
Time Constant .6  
Antenna 3146  
SN 9702-4895  
AF & Mtr Fact \_\_\_\_\_

RADIATED EMISSIONS  
OF S3



Co. Shure Brothers  
 Date 8-4-98  
 Test # \_\_\_\_\_  
 Product \_\_\_\_\_  
 Model PSM 700  
 S/N \_\_\_\_\_  
 Conducted by CB  
 EMC-25 S/N 645  
 Cal at 1 MHz ✓  
 Scan Speed 30 min  
 Bandwidth wide  
 Detector peak  
 Dwell 1.0 clock  
 CRM-25 S/N 116  
 Detector Cispr  
 Output Log  
 Pen 1 CRM/EMC  
 Time Constant .6  
 Antenna 3146  
 SN 9702-4895  
 AF & Mtr Fact \_\_\_\_\_

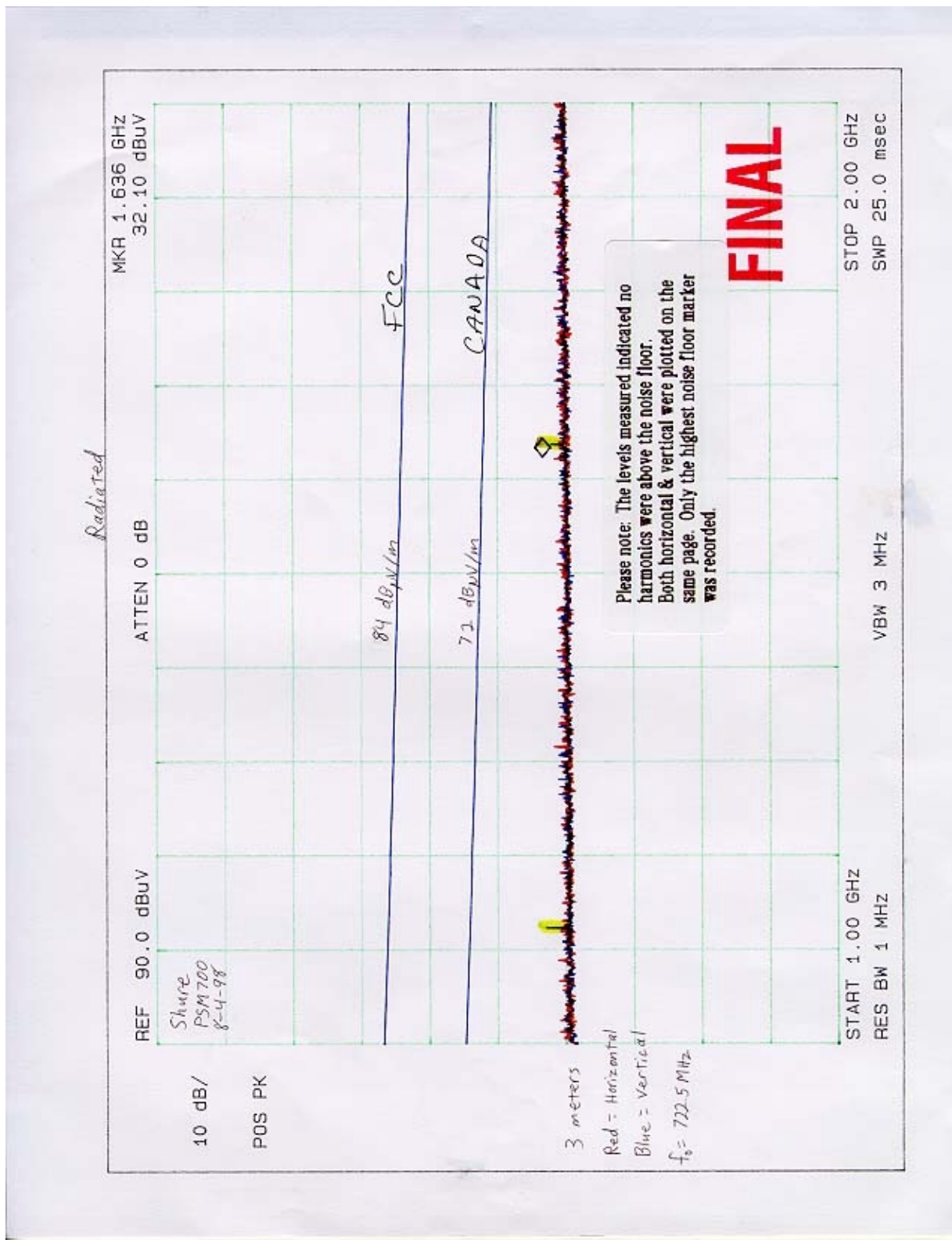
$f_c = 722.5$  MHz

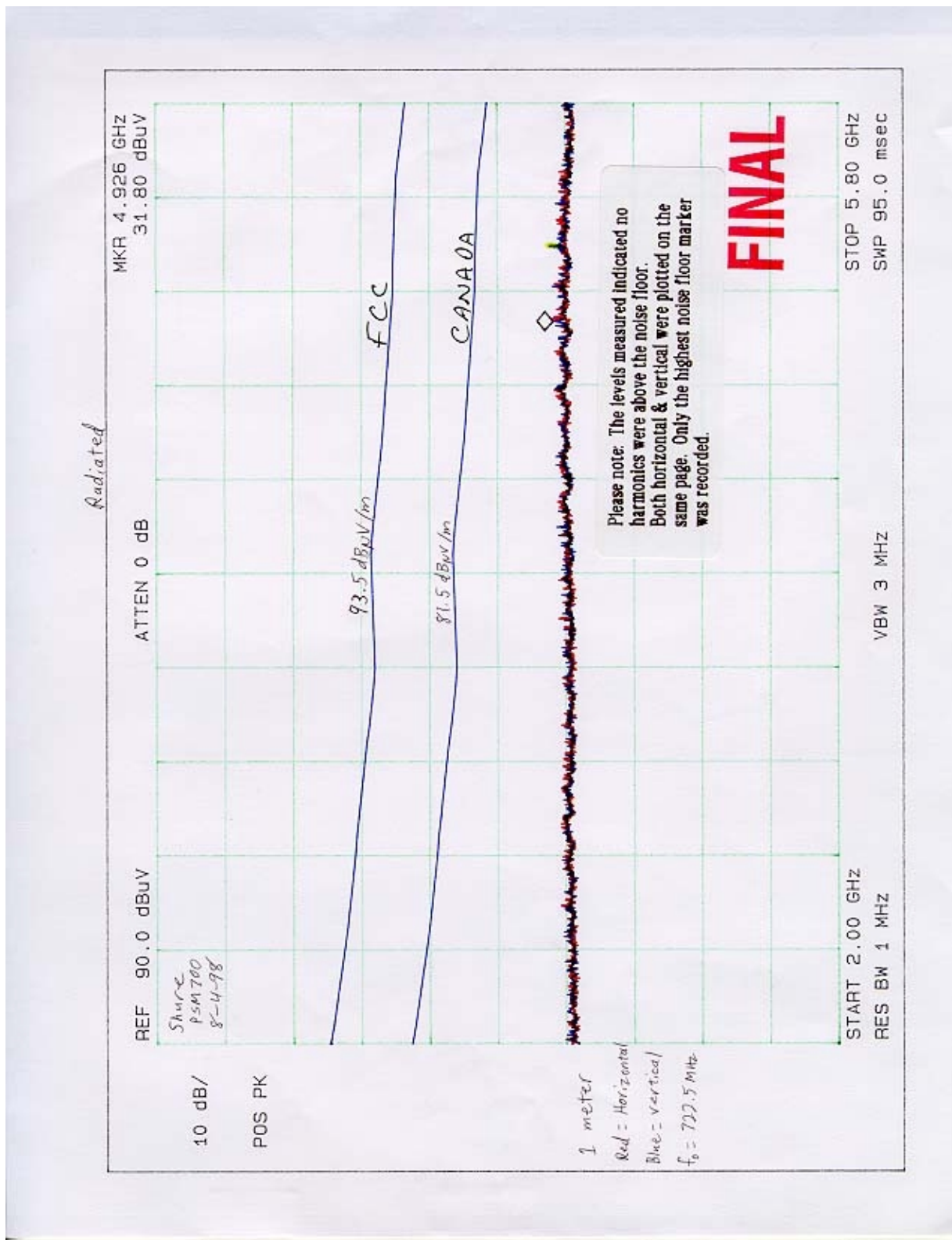
RADIATED EMISSIONS  
OF S3  
Page \_\_\_ of \_\_\_

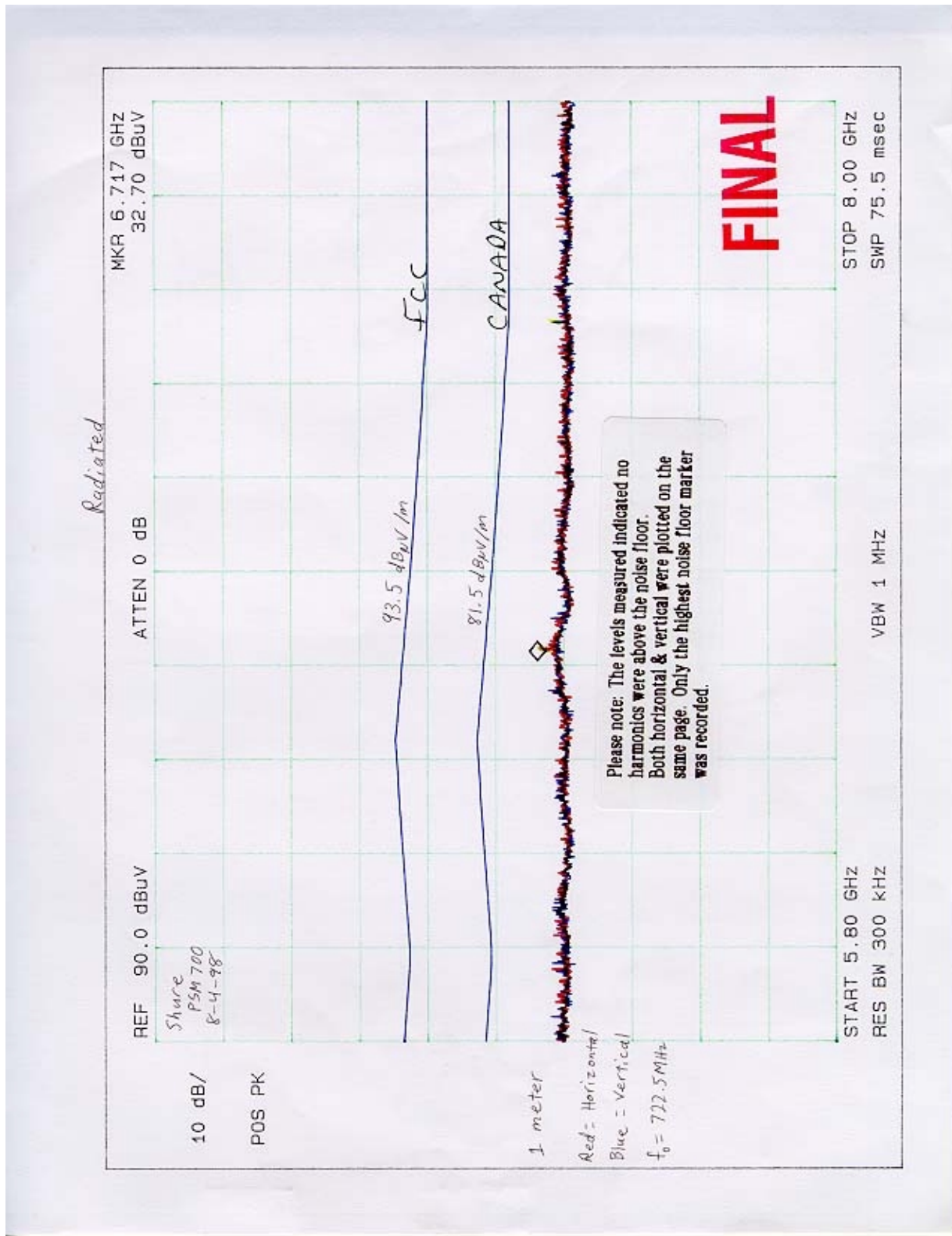
FREQUENCY IN MHz



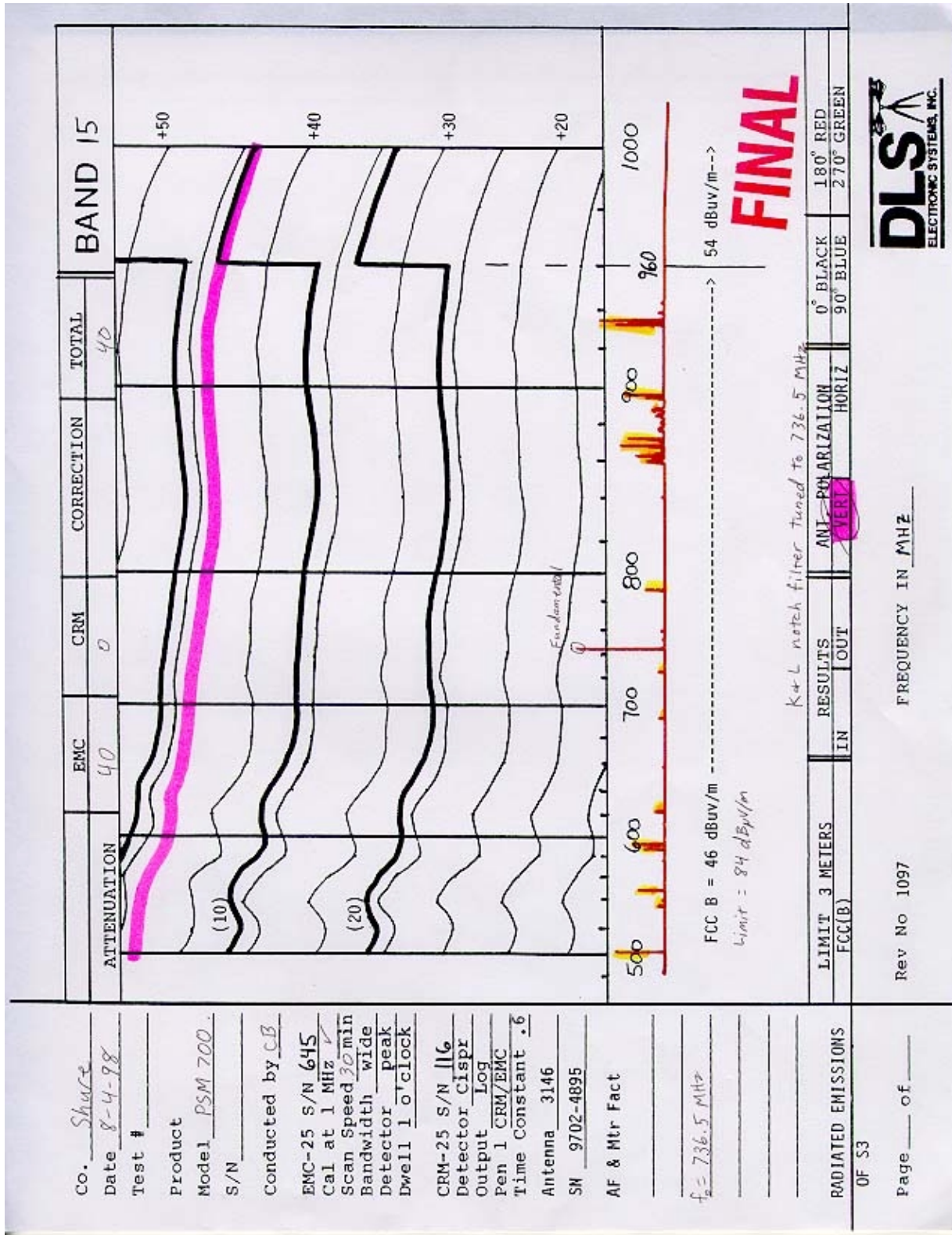










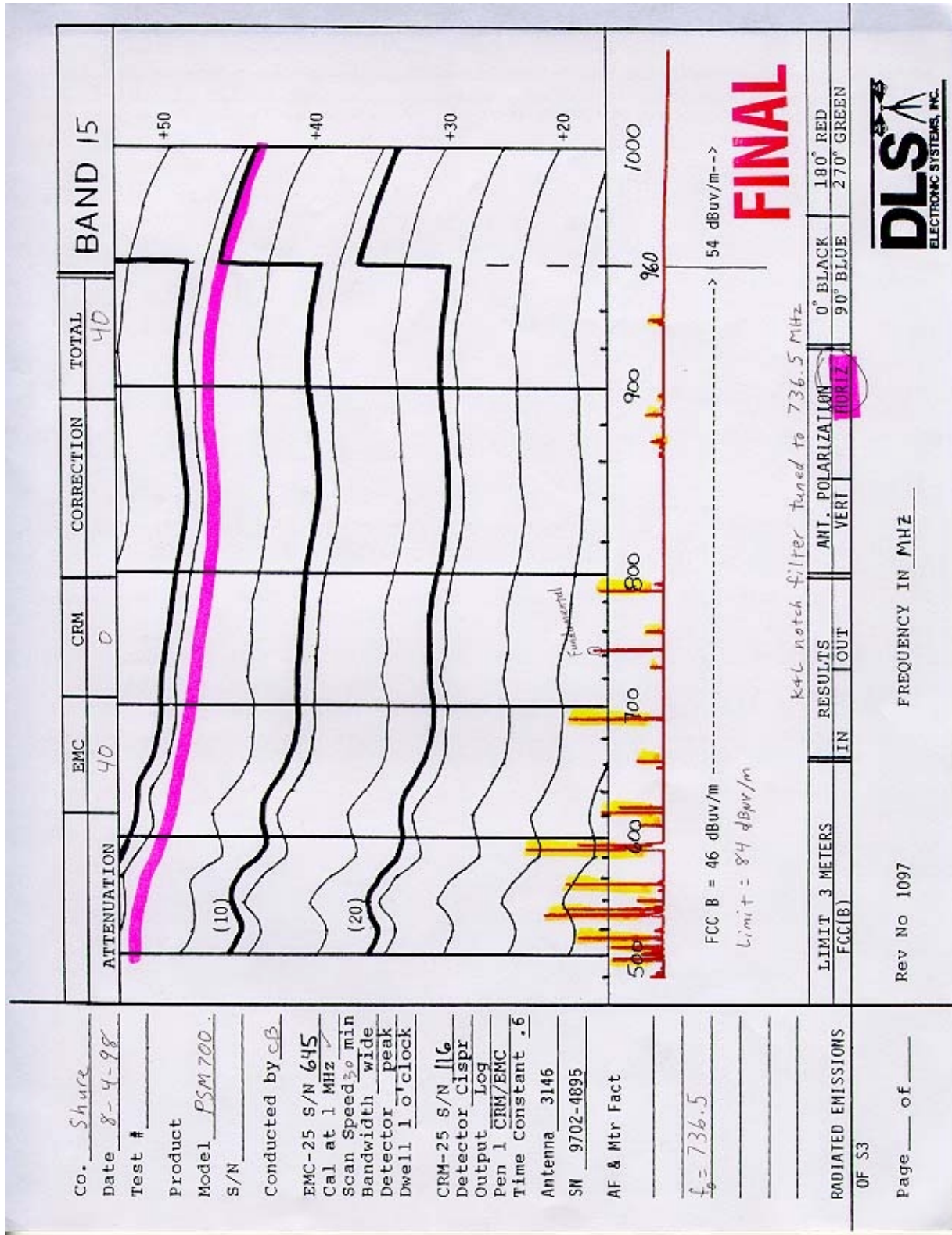


Co. Shurt  
 Date 8-4-98  
 Test # \_\_\_\_\_  
 Product \_\_\_\_\_  
 Model PSM 700  
 S/N \_\_\_\_\_  
 Conducted by CB  
 EMC-25 S/N 645  
 Cal at 1 MHz ✓  
 Scan Speed 30 min  
 Bandwidth wide  
 Detector peak  
 Dwell 1 o'clock  
 CRM-25 S/N 116  
 Detector Cispr  
 Output Log  
 Pen 1 CRM/EMC  
 Time Constant .6  
 Antenna 3146  
 SW 9702-4895  
 AF & Mtr Fact \_\_\_\_\_

$f_0 = 736.5$  MHz

RADIATED EMISSIONS  
OF S3  
Page \_\_\_ of \_\_\_

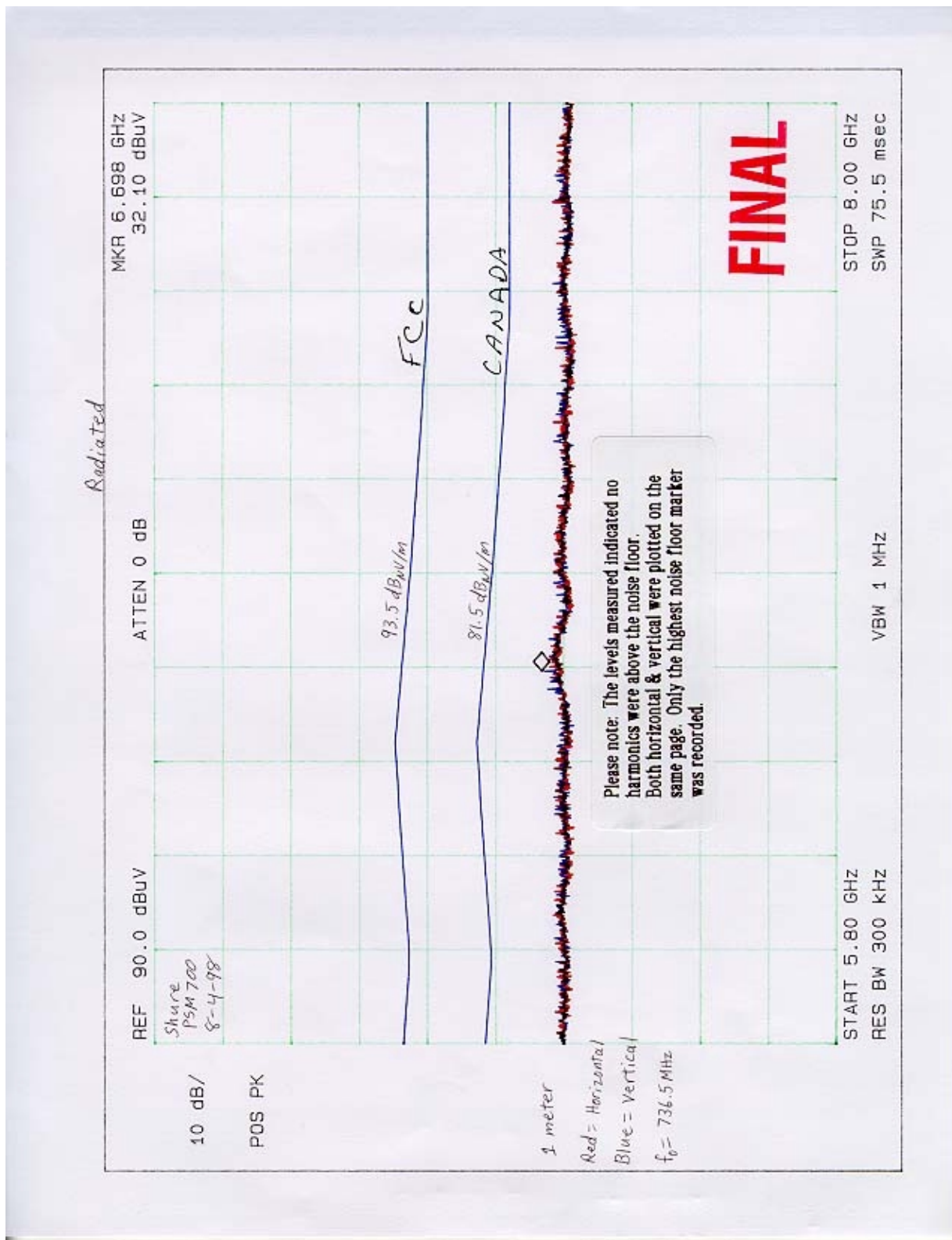


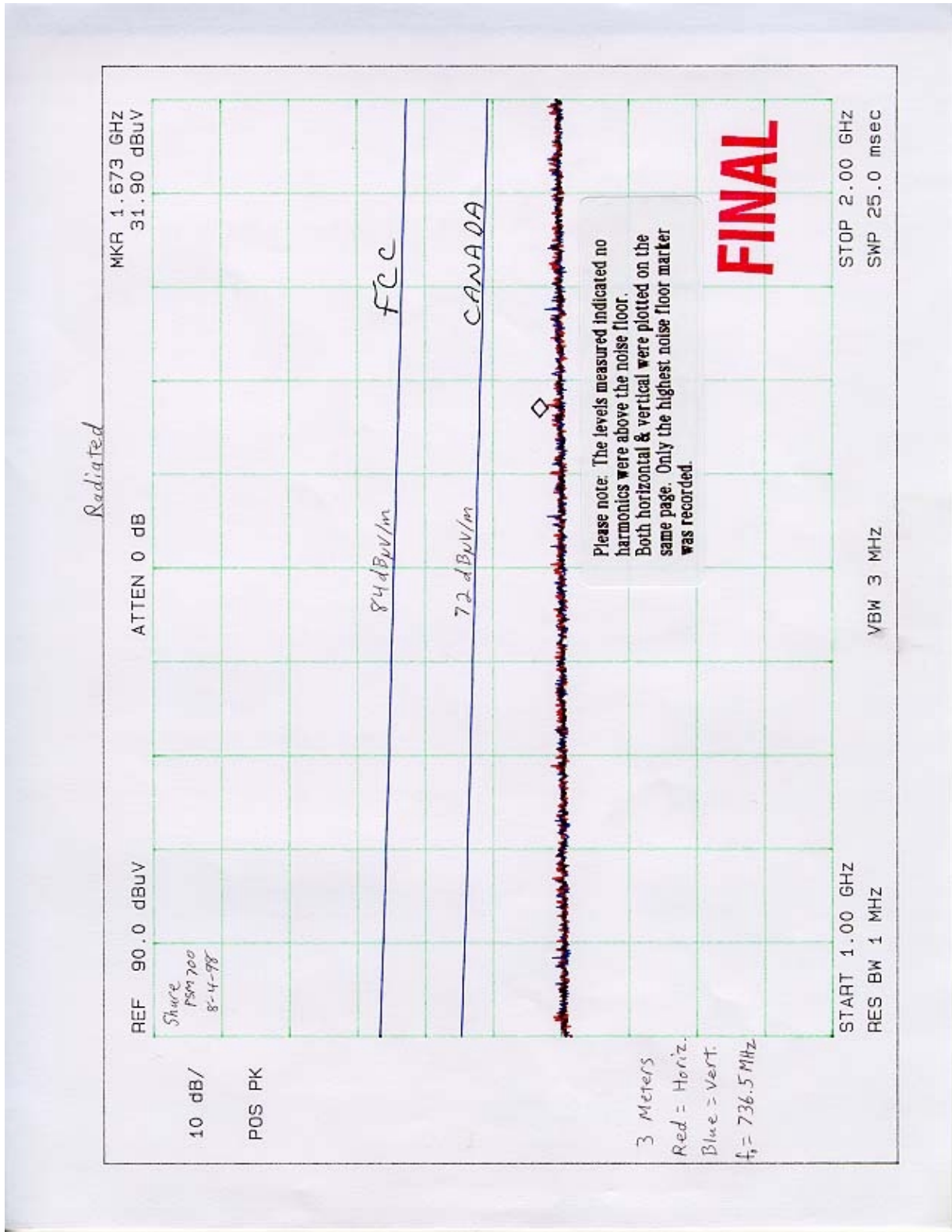


Co. Shure  
 Date 8-4-98  
 Test # \_\_\_\_\_  
 Product \_\_\_\_\_  
 Model PSM700  
 S/N \_\_\_\_\_  
 Conducted by CB  
 EMC-25 S/N 645  
 Cal at 1 MHz ✓  
 Scan Speed 30 min  
 Bandwidth wide  
 Detector peak  
 Dwell 1 clock  
 CRM-25 S/N 116  
 Detector Cispr  
 Output Log  
 Pen 1 CRM/EMC  
 Time Constant .6  
 Antenna 3146  
 SW 9702-4895  
 AF & Mtr Fact \_\_\_\_\_

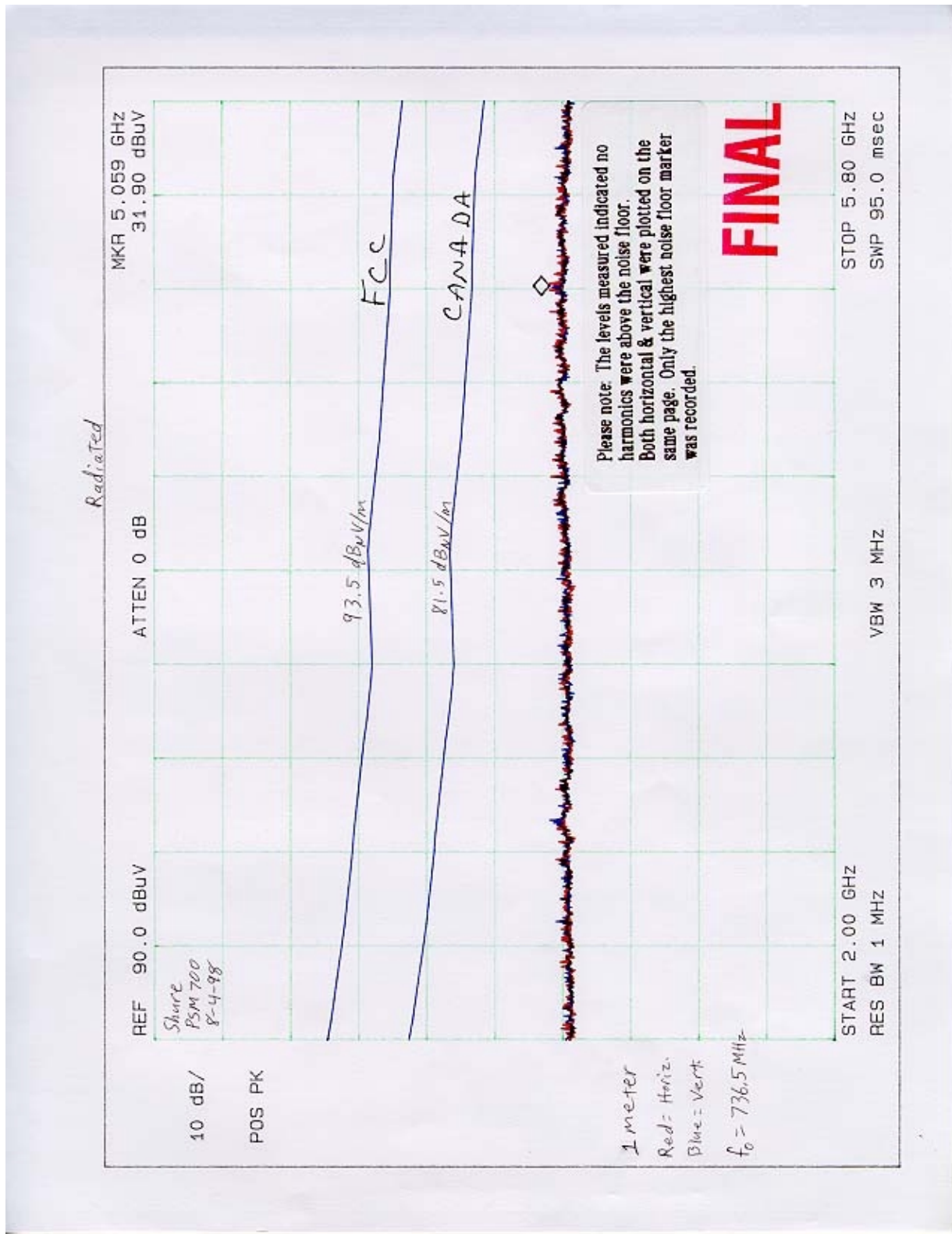
f<sub>0</sub> = 736.5

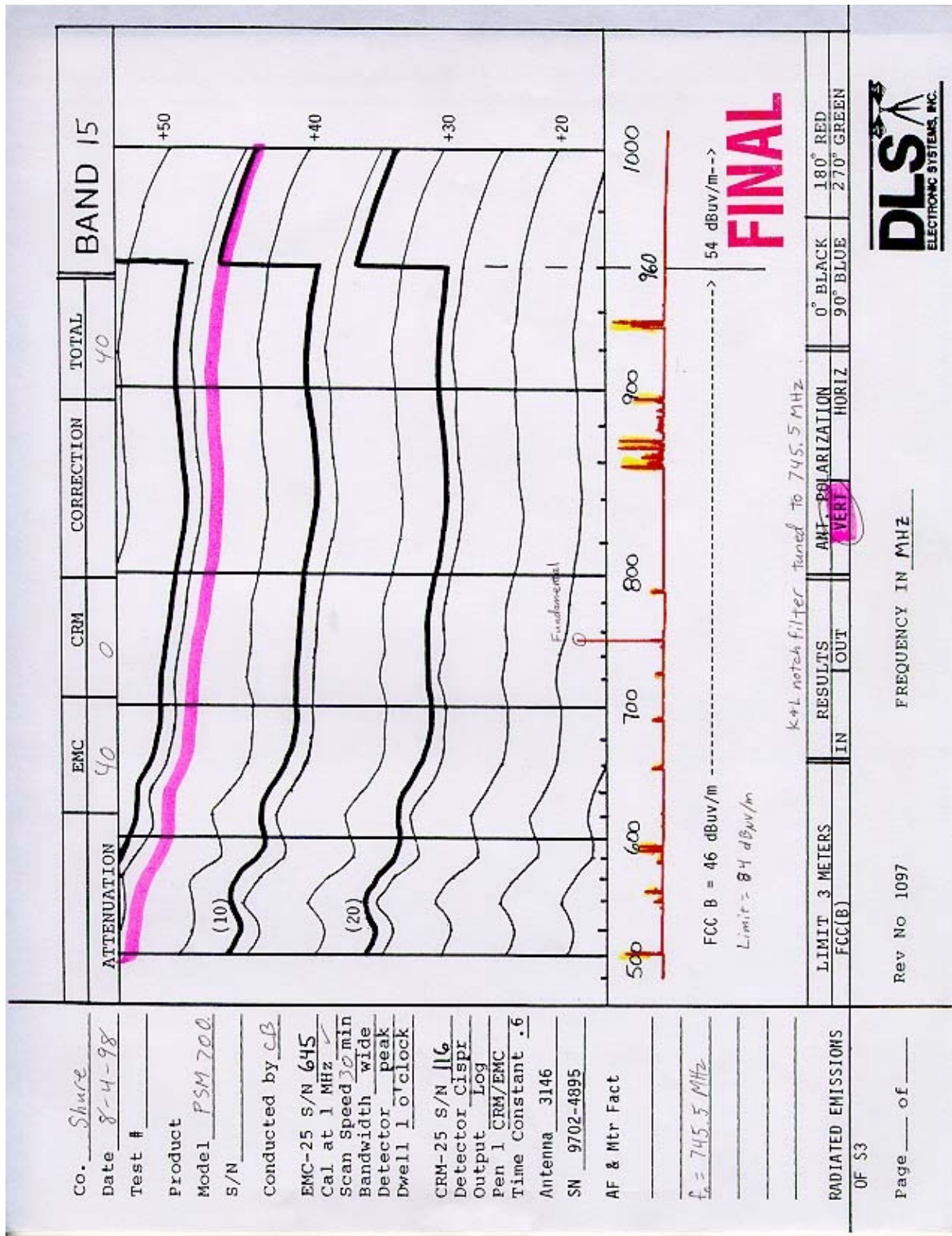
RADIATED EMISSIONS  
OF S3  
Page \_\_\_ of \_\_\_









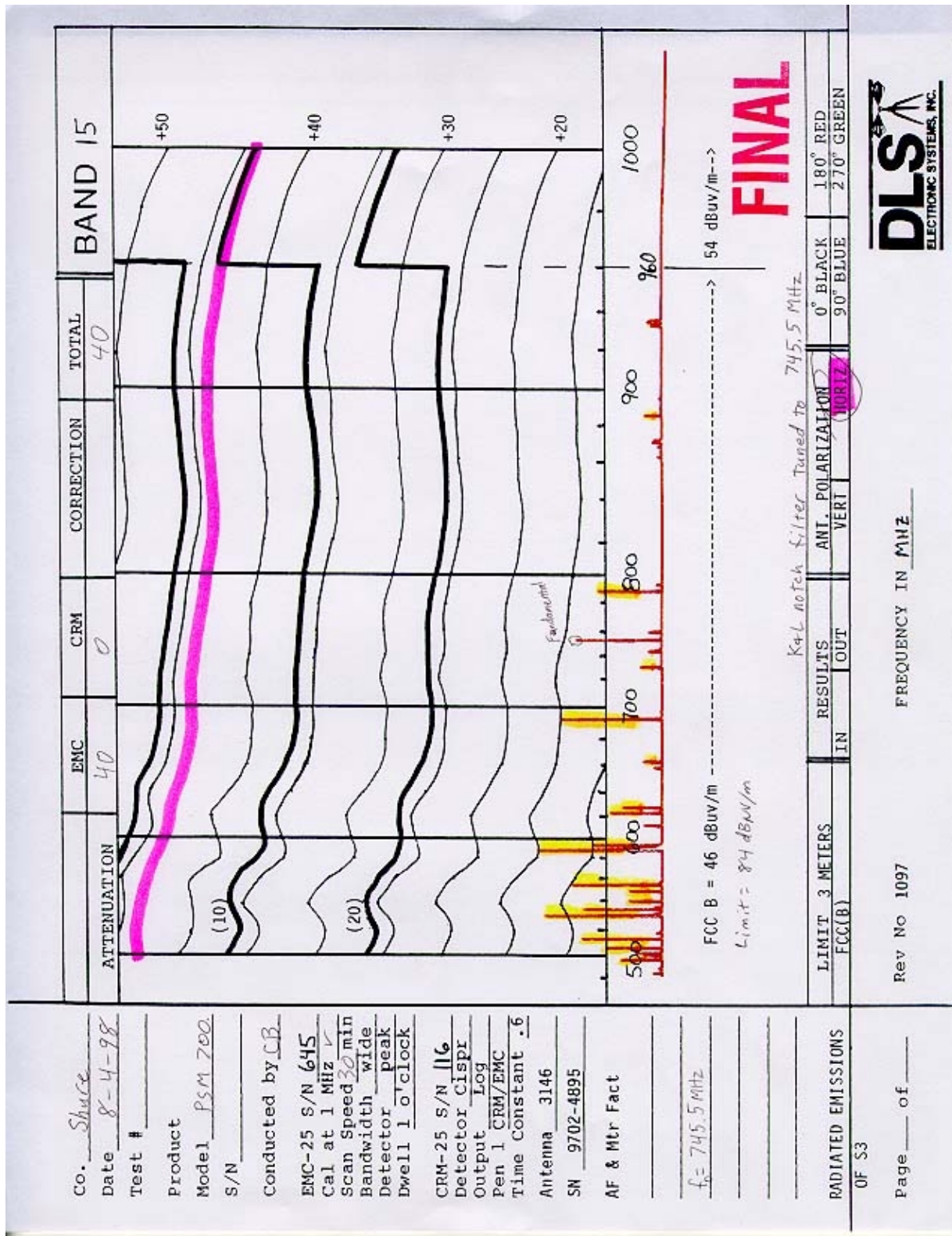


Co. Shure  
 Date 8-4-98  
 Test # \_\_\_\_\_  
 Product \_\_\_\_\_  
 Model PSM 700  
 S/N \_\_\_\_\_  
 Conducted by CB  
 EMC-25 S/N 645  
 Cal at 1 MHz   
 Scan Speed 30 min  
 Bandwidth wide  
 Detector peak  
 Dwell 1 o'clock  
 CRM-25 S/N 116  
 Detector Cispr  
 Output Log  
 Pen 1 CRM/EMC  
 Time Constant .6  
 Antenna 3146  
 SN 9702-4895

AF & Mtr Fact \_\_\_\_\_  
 f<sub>c</sub> = 745.5 MHz

RADIATED EMISSIONS  
 OF S3  
 Page \_\_\_\_\_ of \_\_\_\_\_



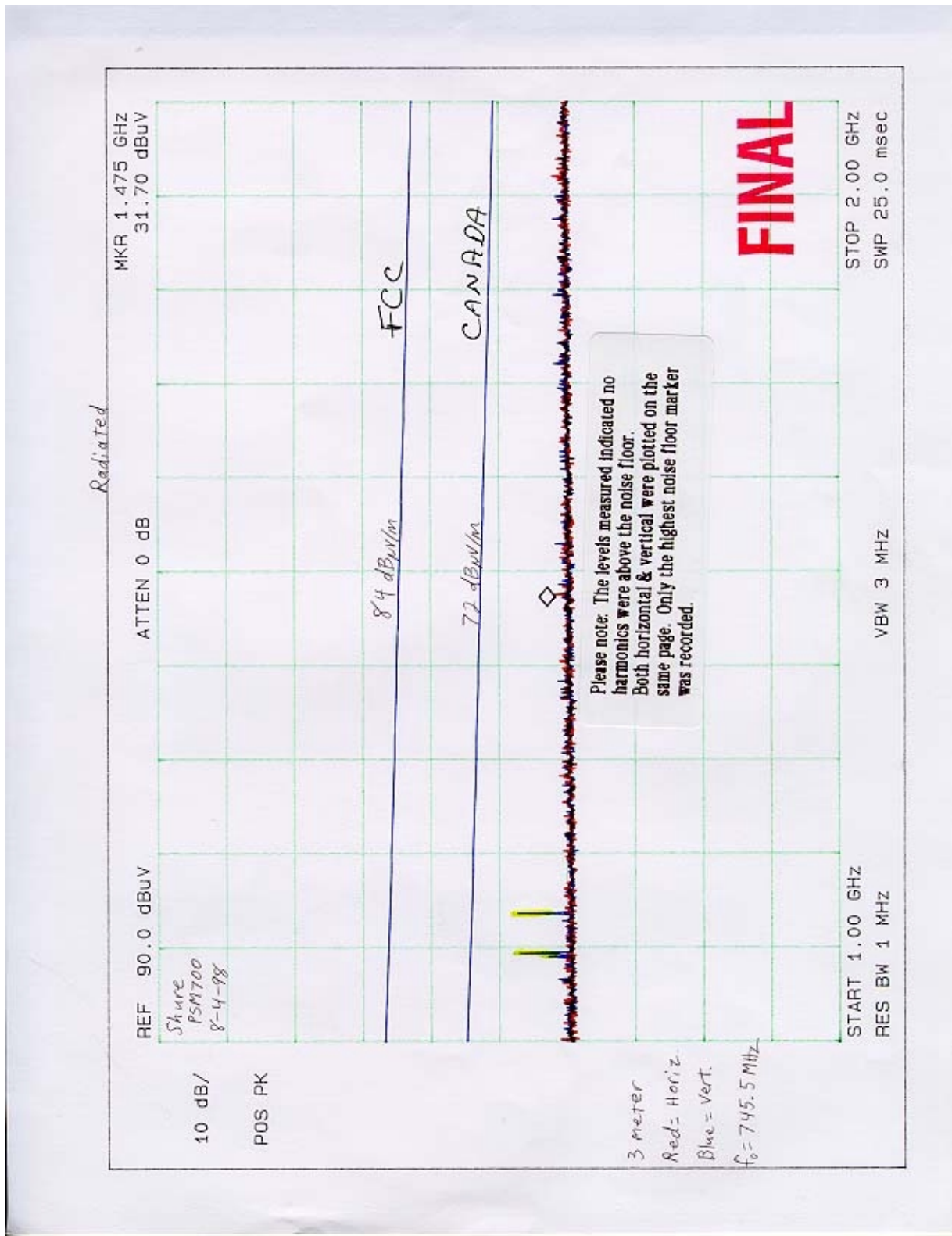


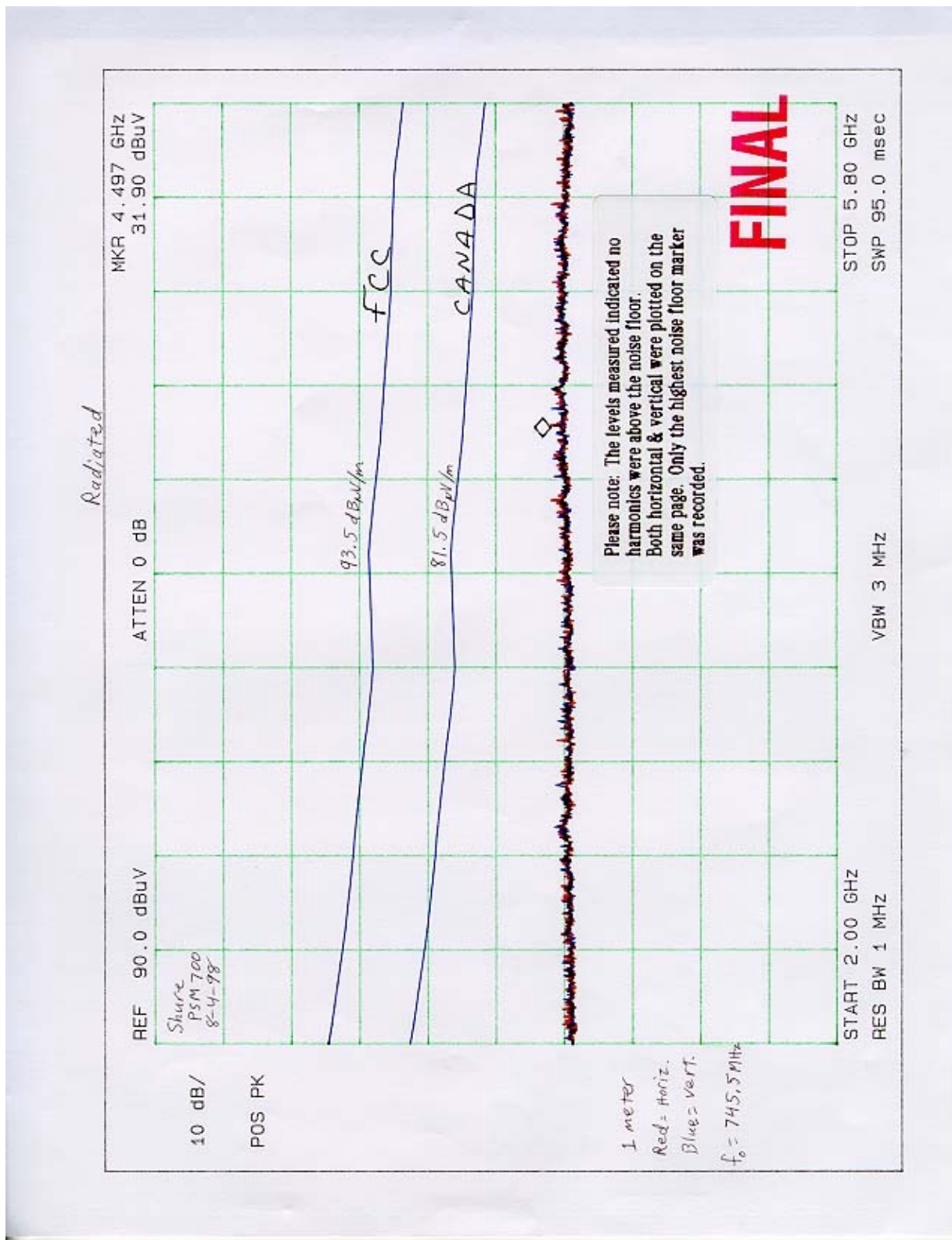
Co. Shure  
 Date 8-4-98  
 Test # \_\_\_\_\_  
 Product \_\_\_\_\_  
 Model PSM 700  
 S/N \_\_\_\_\_  
 Conducted by CB  
 EMC-25 S/N 645  
 Cal at 1 MHz ✓  
 Scan Speed 30 min  
 Bandwidth wide  
 Detector peak  
 Dwell 1 o'clock  
 CRM-25 S/N 116  
 Detector Cispr  
 Output Log  
 Pen 1 CRM/EMC  
 Time Constant .6  
 Antenna 3146  
 SN 9702-4895  
 AF & Mtr Fact \_\_\_\_\_

$f_c = 745.5$  MHz

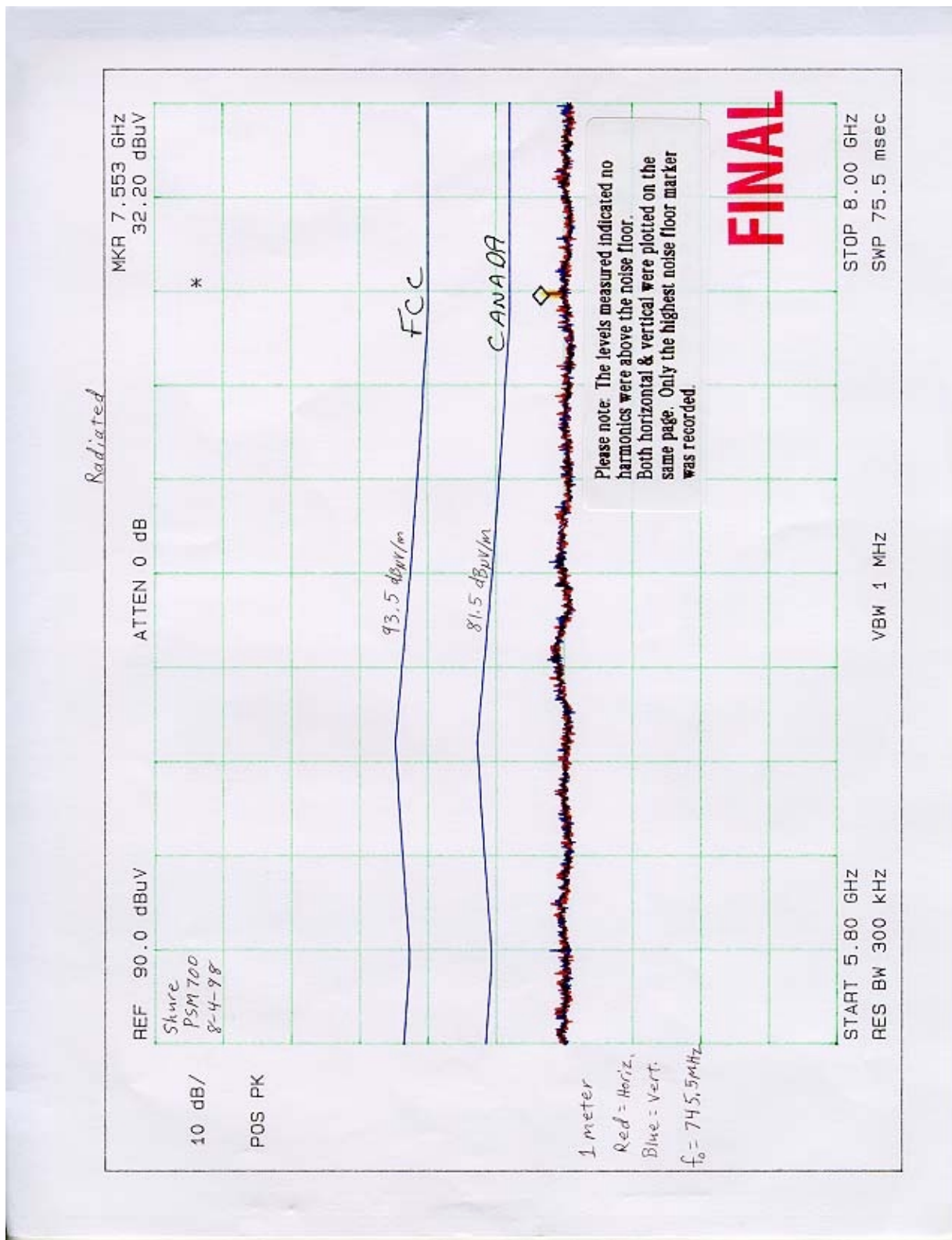
RADIATED EMISSIONS  
OF S3

Page \_\_\_\_\_ of \_\_\_\_\_











12.0 FREQUENCY STABILITY - PART 2.995a (**Temperature**)

The frequency stability was measured from -30° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Shure Brothers Wireless PSM 700 Transmitter oscillator circuitry to stabilize. The following information was taken:

**FREQUENCY STABILITY FOR TEMPERATURE VARIATION IN MHz:**

-30°	722.6755
-20°	722.6822
-10°	722.6819
0°	722.6819
+10°	722.6777
+20°	722.6768
+30°	722.6746
+40°	722.6722
+50°	722.6704

Worst Case Variance:

1177.978515625 Hz

As stated in Part 74, Section 74.861 e-4 the Frequency Tolerance and Margin for this range are as follows:

**Frequency Tolerance: = 0.005%**

722.6704 \* 0.005% = **36133.5206031799 Hz**

36133.5206031799 - 1177.978515625 = **34955.5420875549 Hz**

**This is well within the specified limits.**

**NOTE:** See the following pages for the graphs of the actual measurements made:

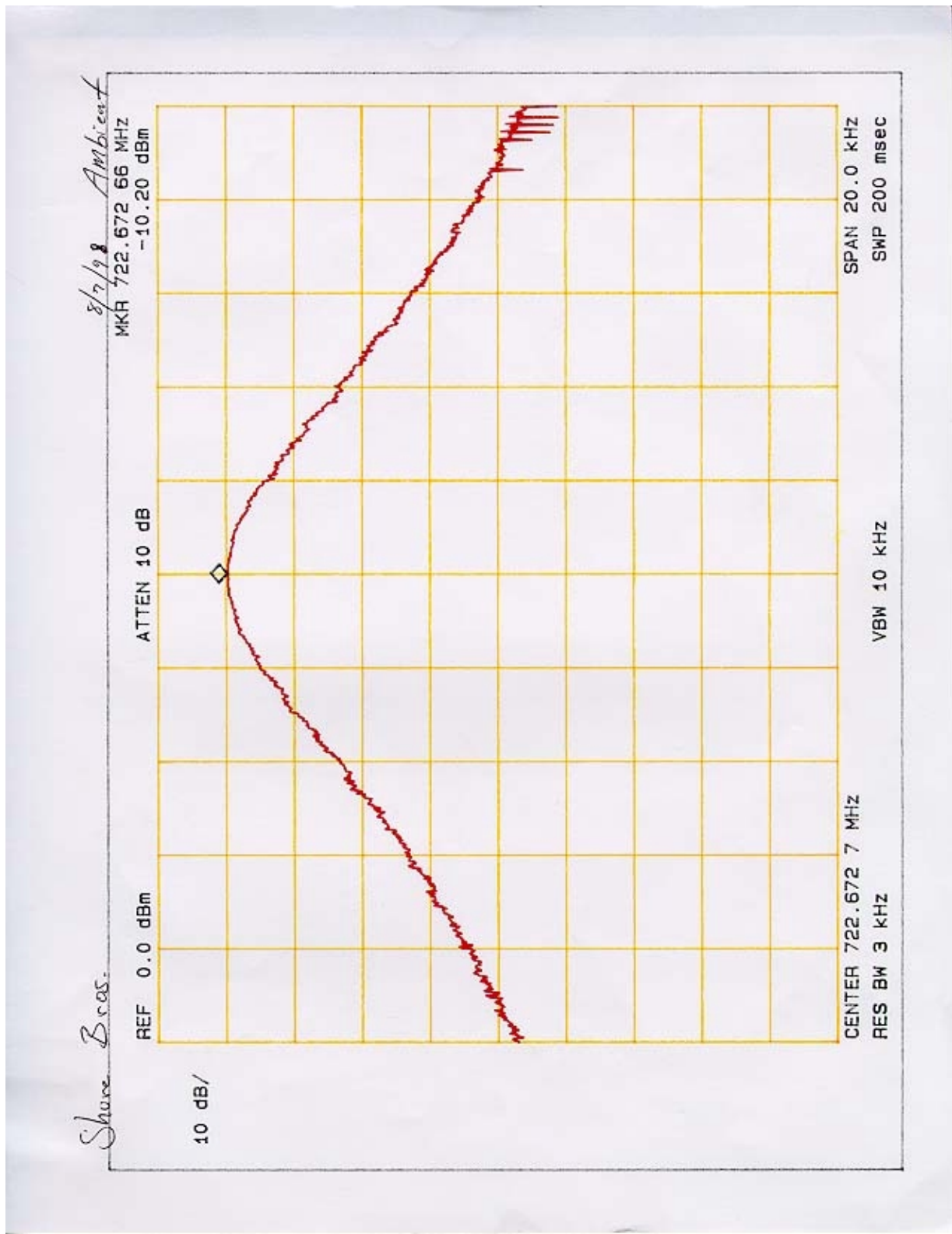


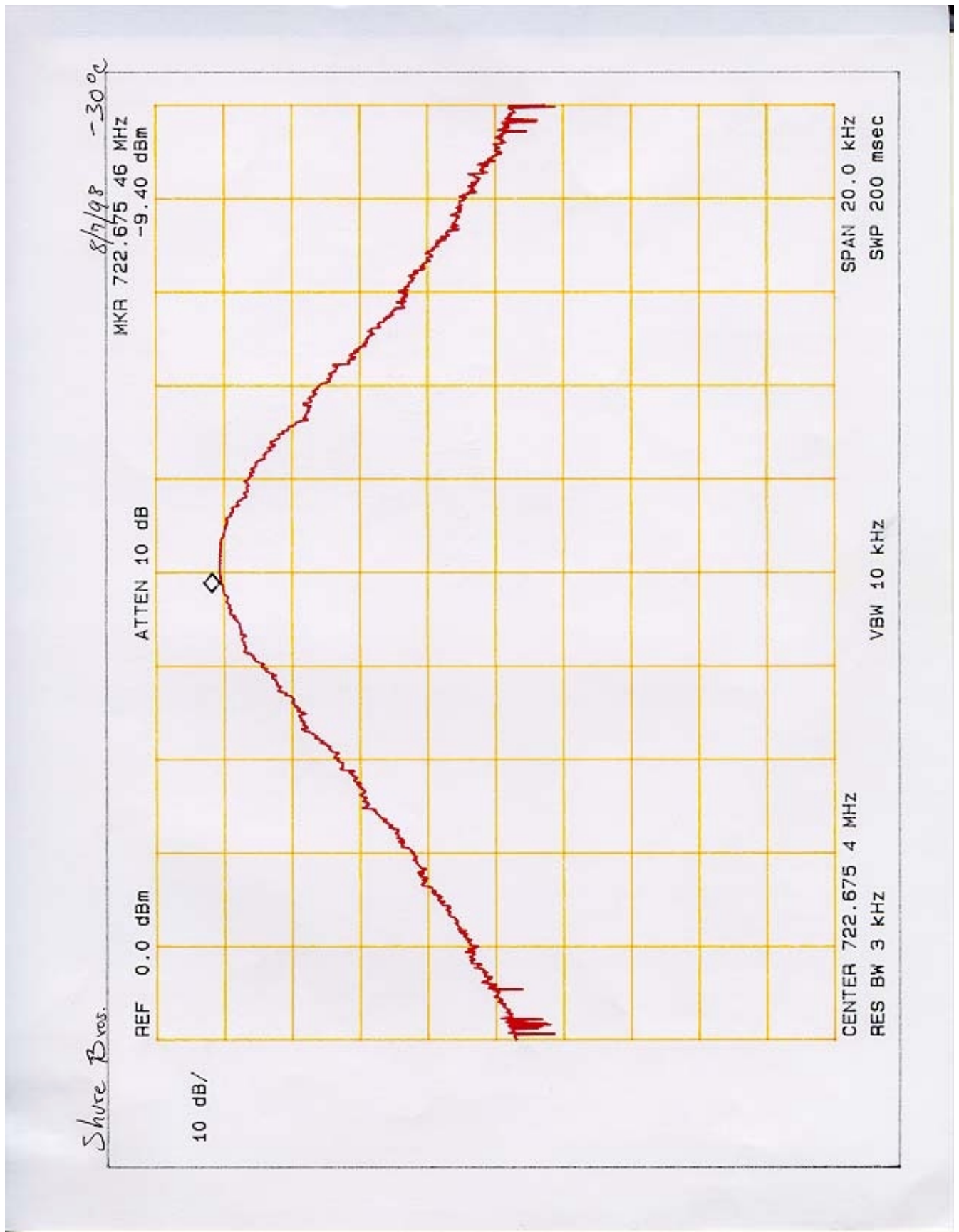
EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

**GRAPHS TAKEN FOR FEQUENCY  
STABILITY WHEN VARYING THE TEMPERATURE**

**PART 2.995A**

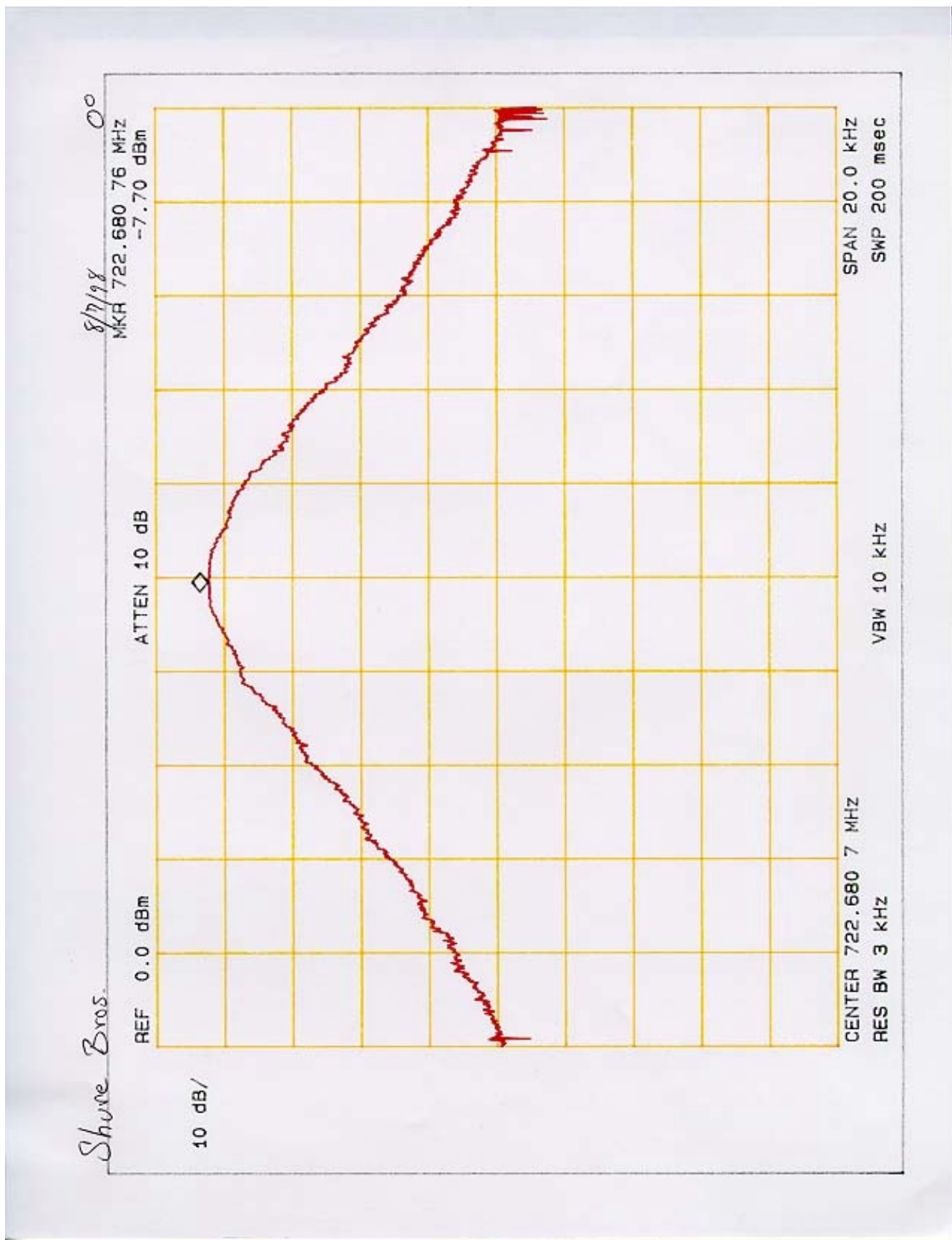




























13.0 FREQUENCY STABILITY - PART 2.995d (Voltage Variation)

The frequency stability of Shure Brothers Wireless PSM 700 Transmitter was measured by varying the primary supply voltage from 85% to 115% of nominal value for all equipment other than hand carried battery equipment.

**FREQUENCY STABILITY FOR VOLTAGE VARIATION:**

85%	-13
100%	-12.1
115%	-11.7

**FREQUENCY STABILITY FOR HAND HELD DEVICES:**

For hand carried, battery powered equipment, the supply voltage was reduced to the battery operating end point specified by the manufacturer. Readings were taken at the reduced end point and with a fresh battery:

Fresh Battery verses Battery end point:

- Frequency #1 **NA Hz**
- Frequency #2 **NA Hz**
- Frequency #3 **NA Hz**
- Frequency #4 **NA Hz**
- Frequency #5 **NA Hz**
- Frequency #6 **NA Hz**

As stated in Part 74, Section 74.861 e-4 the Frequency Tolerance and Margin for this range are as follows:

**Frequency Tolerance: 0.005%**

**Limit: 36133.5206031799 Hz**

NOTE: See the following pages for the graphs of the actual measurements made:





EMC Test Services  
1250 Peterson Drive, Wheeling, Illinois 60090, USA

Report No. 6824  
07/10/01

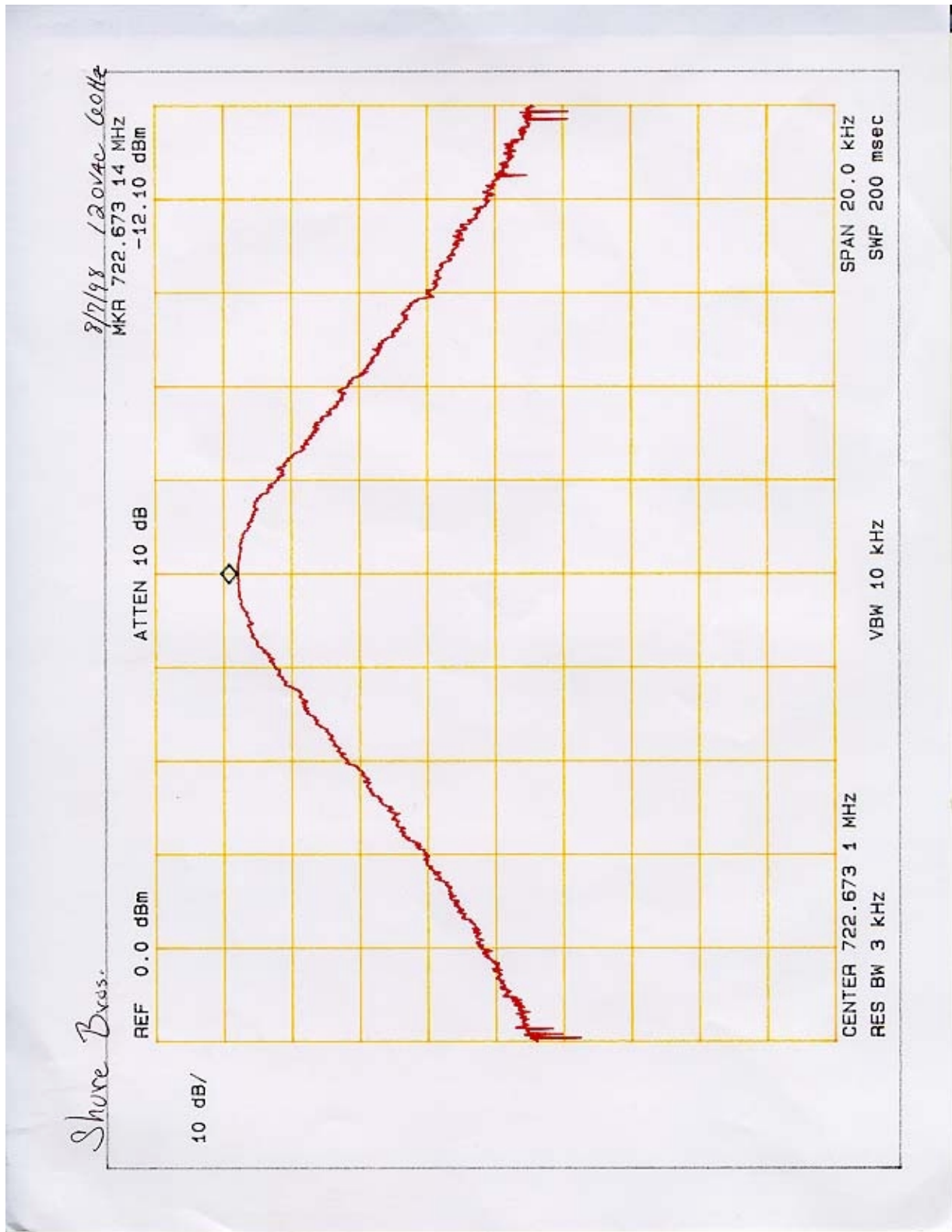
**GRAPHS TAKEN FOR FREQUENCY**

**STABILITY WHEN VARYING THE**

**PRIMARY SUPPLY VOLTAGE**

**PART 2.995d**









#### 14.0 PHOTO INFORMATION AND TEST SET-UP

The test set-up can be seen on the accompanying photo page.

- Item 0 Shure Brothers Wireless PSM 700 Transmitter  
FCC ID#: DD4P7T SN: NA
- Item 1 Shielded CH2 In Cable with Metal Shells. 1.27m
- Item 2 Shielded CH1 In Cable with Metal Shells. 1.04m
- Item 3 L Loop Out Cable. .77m
- Item 4 Non-Shielded R Loop Out Cable with Plastic Shells. .77m
- Item 5 Non-shielded AC Power Line Cord. 2.3m
- Item 6 Earphone and non-shielded Earphone Cable with Plastic Shells. 1.6m
- Item 7 HP 3312A Function Generator (not part of EUT)
- Item 8
- Item 9
- Item 10

15.0 RADIATED PHOTOS TAKEN DURING TESTING.





15.0 CONDUCTED PHOTOS TAKEN DURING TESTING





## 16.0 CHANGE INFORMATION

The following changes were implemented during the testing and must be incorporated into the production units to ensure compliance.

Change 1. There were no changes made at D.L.S. Electronic Systems, Inc.

Change 2.

Change 3.

Change 4.

Change 5.



16.0 CHANGE INFORMATION (CON'T)

Change 6.

Change 7.

Change 8.

Change 9.

Change 10.

The responsibility of implementing the changes listed in this report is accepted or I certify that no changes were made

by \_\_\_\_\_  
Signature Title

for \_\_\_\_\_  
Company Name Date



## 17.0 RESULTS OF TESTS

The emission test results can be seen on pages at the end of this report. Data sheets indicating the open field radiated measurements can also be found with this report. Those points on the radiated charts shown with a yellow mark are background frequencies which were verified during the test.

## 18.0 CONCLUSION

It was found that the Wireless Personal Stereo Monitor System 6825, S/N NA 0 the radio interference emission requirements of the FCC "Rules and Regulations", Part 74, Subpart H, Sections 74.801 to 74.882 for Low Power Auxiliary Stations operating in the 614 to 806 MHz Frequency Band. This test report relates only to the items tested.

This report contains the following number of pages.

Text: 93 pages

Data Summary: 9pages

Charts: 44 pages



TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer/Description	Model Number	Serial Number	Frequency Range	Cal Due Date
*Spectrum Analyzer	Hewlett/Packard	8566B	2240A 02041	5 Hz - 22GHz	9/98
Quasi-Peak Adapter	Hewlett/Packard	85650A	2043A 00121	10 kHz - 1GHz	9/98
Receiver	Electrometrics	EMC-25 Mark-III	772	.01-1000 MHz	10/98
Meter Module	Electrometrics	CRM-25	162	.01-1000 MHz	10/98
Receiver	Electrometrics	EMC-25 Mark-III	804	.01-1000 MHz	10/98
Meter Module	Electrometrics	CRM-25	138	.01-1000 MHz	10/98
Antenna	Electrometrics	BIA-25	2453	20-200 MHz	10/98
Antenna	Electrometrics	LPA-25	1114	200-1000 MHz	10/98
Antenna	Electrometrics	BIA-25	2614	20-200 MHz	10/98
Antenna	Electrometrics	LPA-25	1205	200-1000 MHz	10/98
Antenna	D.L.S.	Dipoles		20-1000 MHz	I/O
Antenna	Electro-Mechanics Co	3115	2479	1 – 18 GHz	I/O

*Firmware Version	29.9.86	Software Version	85864C Rev A
**Firmware Version	14.1.85	Software Version	85864C Rev A
***Firmware Version	5.1.3	Software Version	82301-12029 Rev C

I/O Initial Calibration Only