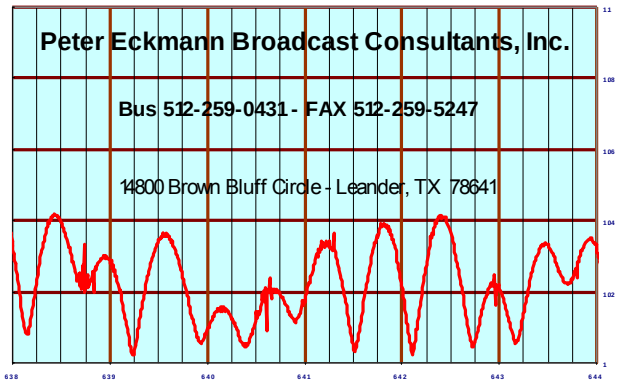


Transmission System Field Service Report

August 8, 2012

KPBS FM 89.5 MHz
Intermod Measurements Report

Mt. Soledad, San Diego, CA

FCC Facility ID : 42117

N 32° 50’ 17”

W 117° 14’ 57”

Work Description : Spectrum measurements to determine and document levels of intermod products within the master FM system after adding the KPBS signal.

SPX Project Identifiers :

C-034987

Sales order 3066799

Service Representative : Charles Cluck, PEBC, Inc.

Report Prepared for

Tamara White @ SPX Communication Technologies

Report Contents

page(s)

Job Notes :

Primary Station Contact : Rockley Curless, rcurless@kpbs.org

Active frequencies : **A** - 89.5 MHz **B** - 94.5 MHz **C** - 98.1 MHz **D**- 100.7 MHz

Test Instrumentation and Setup Description :

Spectrum Analyzer : IFR Model A-7550
Location of test connection : directional coupler in combined output behind patch panel

System Components :

Main Antenna : Dielectric DCRQ8D85

Transmission Lines : parallel runs of existing Dielectric 4-3/16" rigid coax

Multi-port patch panel to allow combined stations' operation into either or both halves of antenna

Eight-module combiner system, four modules now in use

Work Description and Comments :

Four stations are operating in this combined system. The potential intermod frequencies resulting from mixing these four signals were calculated to the third order products using an Xcel calculation spreadsheet; the results of these calculations are presented in tabular form within this report.

All four stations' fundamental frequencies were measured at + 15 dB from the test port located on the combined output just behinf the patch panel, before the signal is split into the two lines feeding the antenna.

The measurement protocol included use of a 3-cavity notch filter to block one of the fundamental frequencies involved in each of the possible products. The filter was adjusted to block the fundamental farthest away from the measurement target frequency.

In addition, in most instances a 3-cavity narrow pass-band filter was used to pass only the predicted intermod frequency. The pass-band insertion loss has been factored into the results as appropriate.

There are 13 possible intermod products which fall within the FM broadcast band. Of these, only three derive from a mixing of the KPBS signal with one of the other stations. The difference between the KPBS signal and the products is in all cases greater than 85 db.

The remaining ten possible products between the original three stations also were measured at levels producing a difference of greater than 85 dB.

The measurements made during this work session clearly indicate that all of the intermod products fall well below the required threshold of -80 dB relative to the fundamental frequency of interest.

Table 1 : Summary of Intermod Measurements

Intermod Frequency	Δ dB Fund. To Product
88.5	100
89.1	85
91.7	90
92.9	106
95.5	85
100.3	85
101.3	96
103.3	98
104.5	85
105.7	92
105.9	113
106.5	88
106.7	85

The Δ dB column shows the difference, in dB, between the measured value of the product and the reference value of the fundamental frequency, + 15 dB.

Intermod frequencies in Red are those which might be formed as a product of KPBS 89.5 MHz with the other three stations. The remaining potential products might be formed through interactions between the original three stations.

Table 2 : Tabulated Measurement Results

product freq	fundamental measured level	pass filter insertion loss	product measured level	dB difference fund > prod	mixed frequencies	notch filter adjustment
88.5	15	-7	-92	100	BC	94.9 MHz
89.1	15	0	-70	85	BD	94.9 MHz
91.7	15	-11	-86	90	BC	94.9 MHz
92.9	15	-11	-102	106	CD	100.7 MHz
95.5	15	0	-70	85	CD	100.7 MHz
100.3	15	0	-70	85	AB	89.5 MHz
101.3	15	-9	-90	96	BC	94.9 MHz
103.3	15	-9	-92	98	CD	98.1 MHz
104.5	15	-9	-79	85	BC	98.1 MHz
105.7	15	-8	-84	91	AB	89.5 MHz
105.9	15	-8	-106	113	CD	98.1 MHz
106.5	15	0	-73	88	BD	94.9 MHz
106.7	15	-8	-78	85	AC	89.5 MHz

Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

Intermod frequencies in Red are those which might be formed as a product of KPBS 89.5 MHz with the other stations. The remaining potential products might be formed through interactions between the original three stations.

Table 3 : Intermod Calculations : KPBS & others

Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

89.5	<FREQ **A**
94.9	<FREQ **B**
184.4	<A+B
5.4	<B-A
179	<2A
189.8	<2B
84.1	<2A-B
100.3	<2B-A
273.9	<2A+B
279.3	<2B+A
368.8	<2A+2B
10.8	<2B-2A
268.5	<3A
284.7	<3B
173.6	<3A-B
363.4	<3A+B
374.2	<3B+A
195.2	<3B-A
458.3	<3A+2B
78.7	<3A-2B
463.7	<3B+2A
105.7	<3B-2A
553.2	<3B+3A
16.2	<3B-3A

89.5	<FREQ **A**
98.1	<FREQ **C**
187.6	<A+C
8.6	<C-A
179	<2A
196.2	<2C
80.9	<2A-C
106.7	<2C-A
277.1	<2A+C
285.7	<2C+A
375.2	<2A+2C
17.2	<2C-2A
268.5	<3A
294.3	<3C
170.4	<3A-C
366.6	<3A+C
383.8	<3C+A
204.8	<3C-A
464.7	<3A+2C
72.3	<3A-2C
473.3	<3C+2A
115.3	<3C-2A
562.8	<3C+3A
25.8	<3C-3A

89.5	<FREQ **A**
100.7	<FREQ **D**
190.2	<A+D
11.2	<D-A
179	<2A
201.4	<2D
78.3	<2A-D
111.9	<2D-A
279.7	<2A+D
290.9	<2D+A
380.4	<2A+2D
22.4	<2D-2A
268.5	<3A
302.1	<3D
167.8	<3A-D
369.2	<3A+D
391.6	<3D+A
212.6	<3D-A
469.9	<3A+2D
67.1	<3A-2D
481.1	<3D+2A
123.1	<3D-2A
570.6	<3D+3A
33.6	<3D-3A

Table 4 : Intermod Calculations : other stations

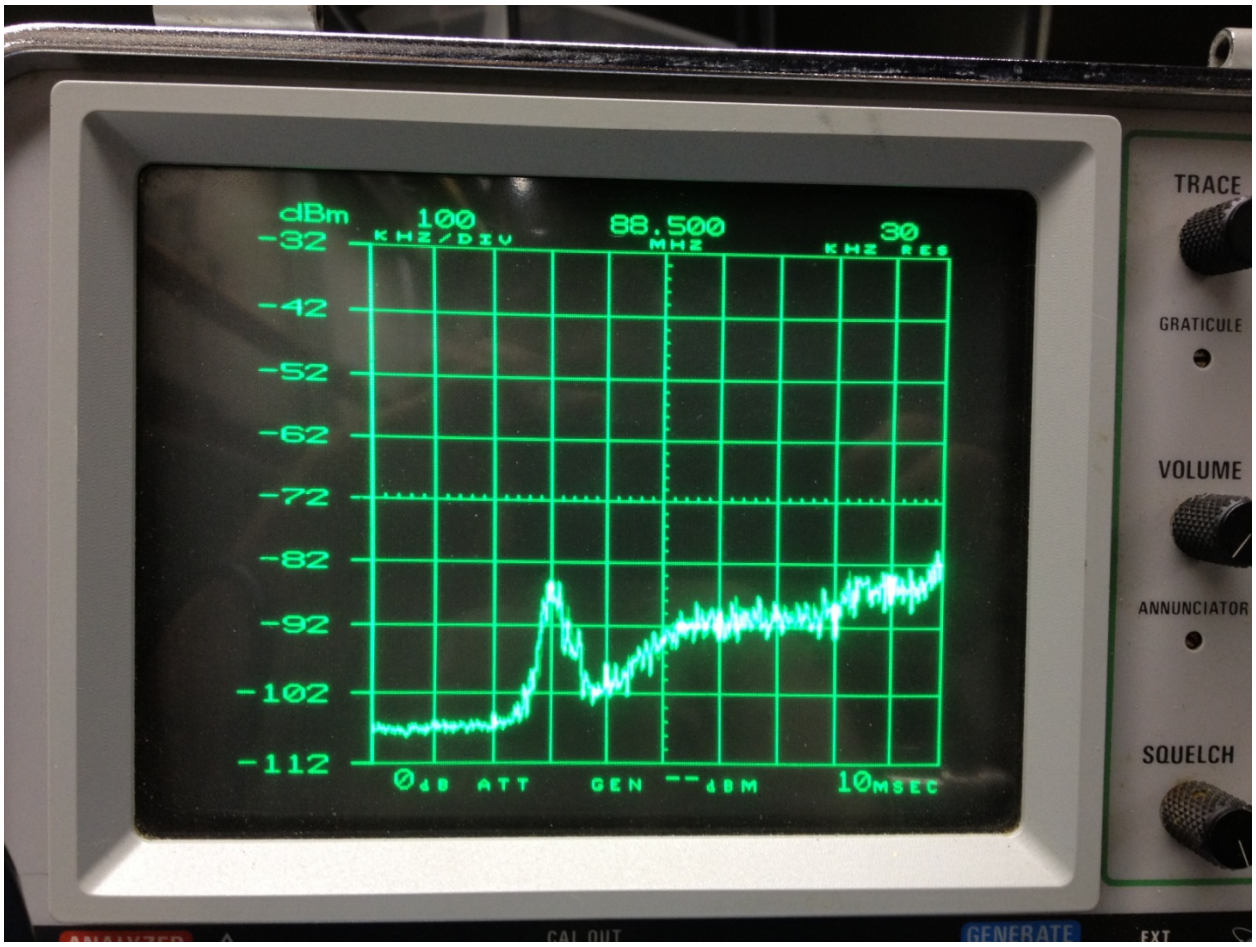
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

94.9	<FREQ **B**
98.1	<FREQ **C**
193	<B+C
3.2	<C-B
189.8	<2B
196.2	<2C
91.7	<2B-C
101.3	<2C-B
287.9	<2B+C
291.1	<2C+B
386	<2B+2C
6.4	<2C-2B
284.7	<3B
294.3	<3C
186.6	<3B-C
382.8	<3B+C
389.2	<3C+B
199.4	<3C-B
480.9	<3B+2C
88.5	<3B-2C
484.1	<3C+2B
104.5	<3C-2B
579	<3C+3B
9.6	<3C-3B

94.9	<FREQ **B**
100.7	<FREQ **D**
195.6	<B+D
5.8	<D-B
189.8	<2B
201.4	<2D
89.1	<2B-D
106.5	<2D-B
290.5	<2B+D
296.3	<2D+B
391.2	<2B+2D
11.6	<2D-2B
284.7	<3B
302.1	<3D
184	<3B-D
385.4	<3B+D
397	<3D+B
207.2	<3D-B
486.1	<3B+2D
83.3	<3B-2D
491.9	<3D+2B
112.3	<3D-2B
586.8	<3D+3B
17.4	<3D-3B

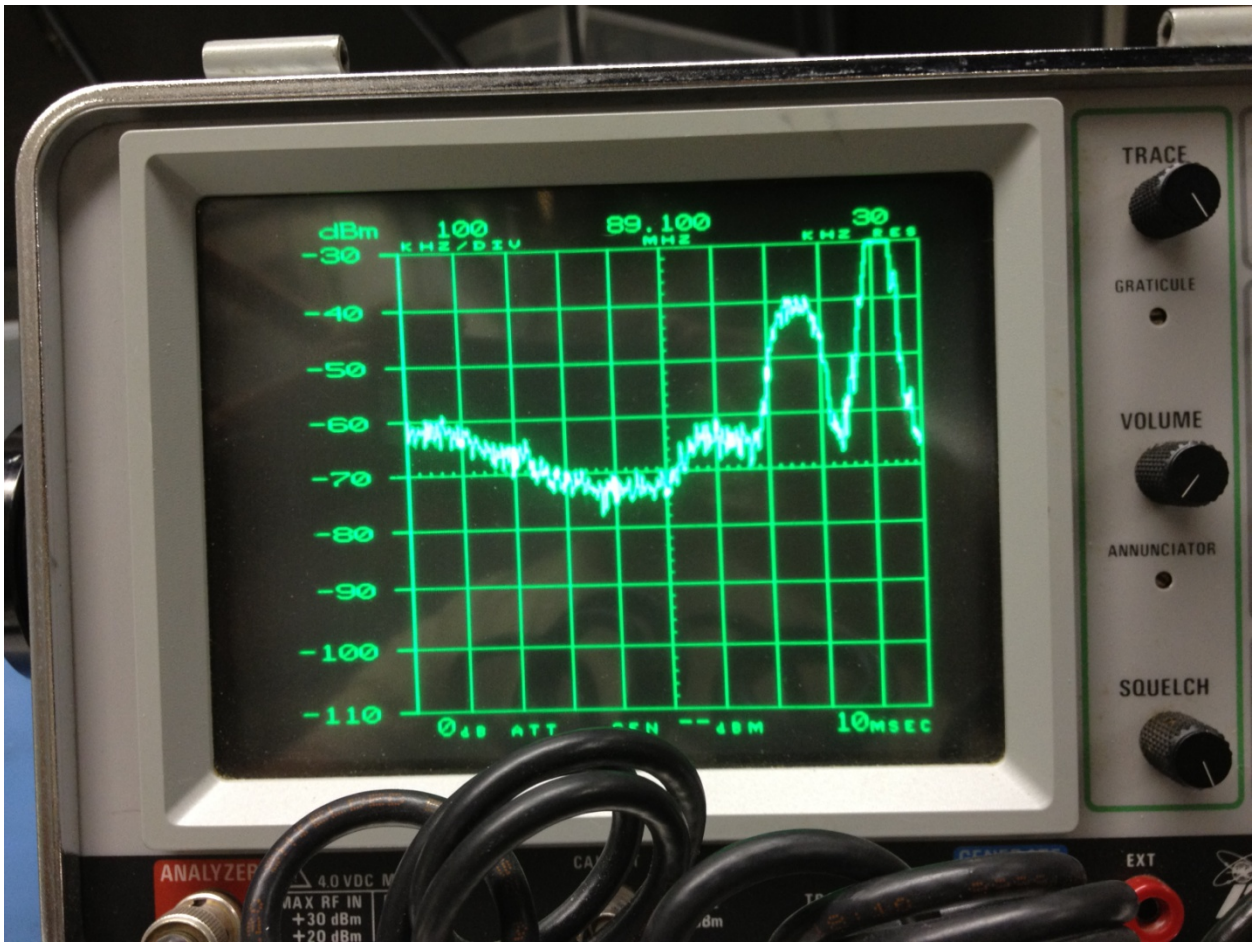
98.1	<FREQ **C**
100.7	<FREQ **D**
198.8	<C+D
2.6	<D-C
196.2	<2C
201.4	<2D
95.5	<2C-D
103.3	<2D-C
296.9	<2C+D
299.5	<2D+C
397.6	<2C+2D
5.2	<2D-2C
294.3	<3C
302.1	<3D
193.6	<3C-D
395	<3C+D
400.2	<3D+C
204	<3D-C
495.7	<3C+2D
92.9	<3C-2D
498.3	<3D+2C
105.9	<3D-2C
596.4	<3D+3C
7.8	<3D-3C

A 01 **88.5** **MHz** **-92 db** **3B - 2C** **p. 09**



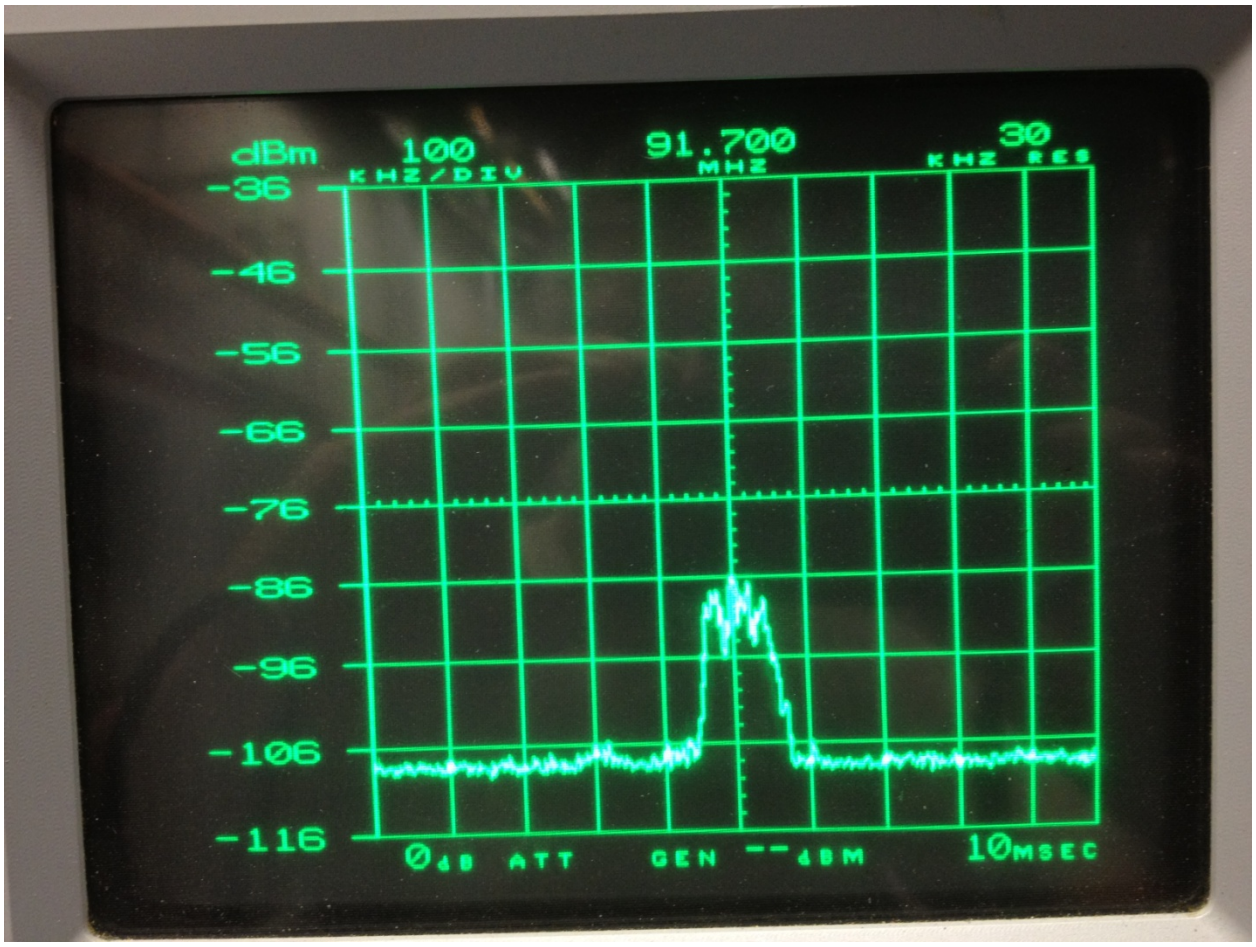
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 02 **89.1** **MHz** **-70 dB** **2B - D** **p. 10**



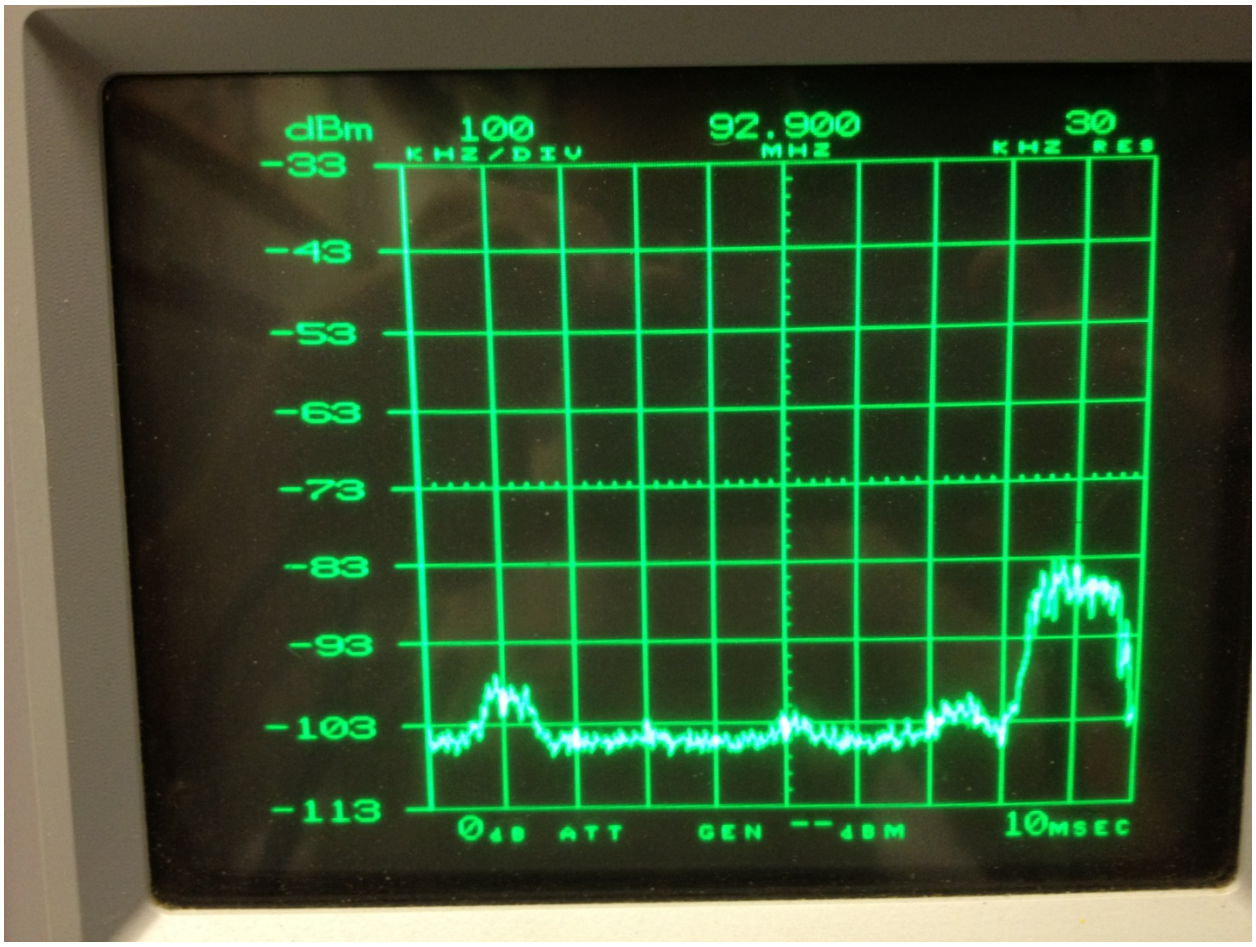
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 03 **91.7** **MHz** **-86 dB** **2B - C** **p. 11**



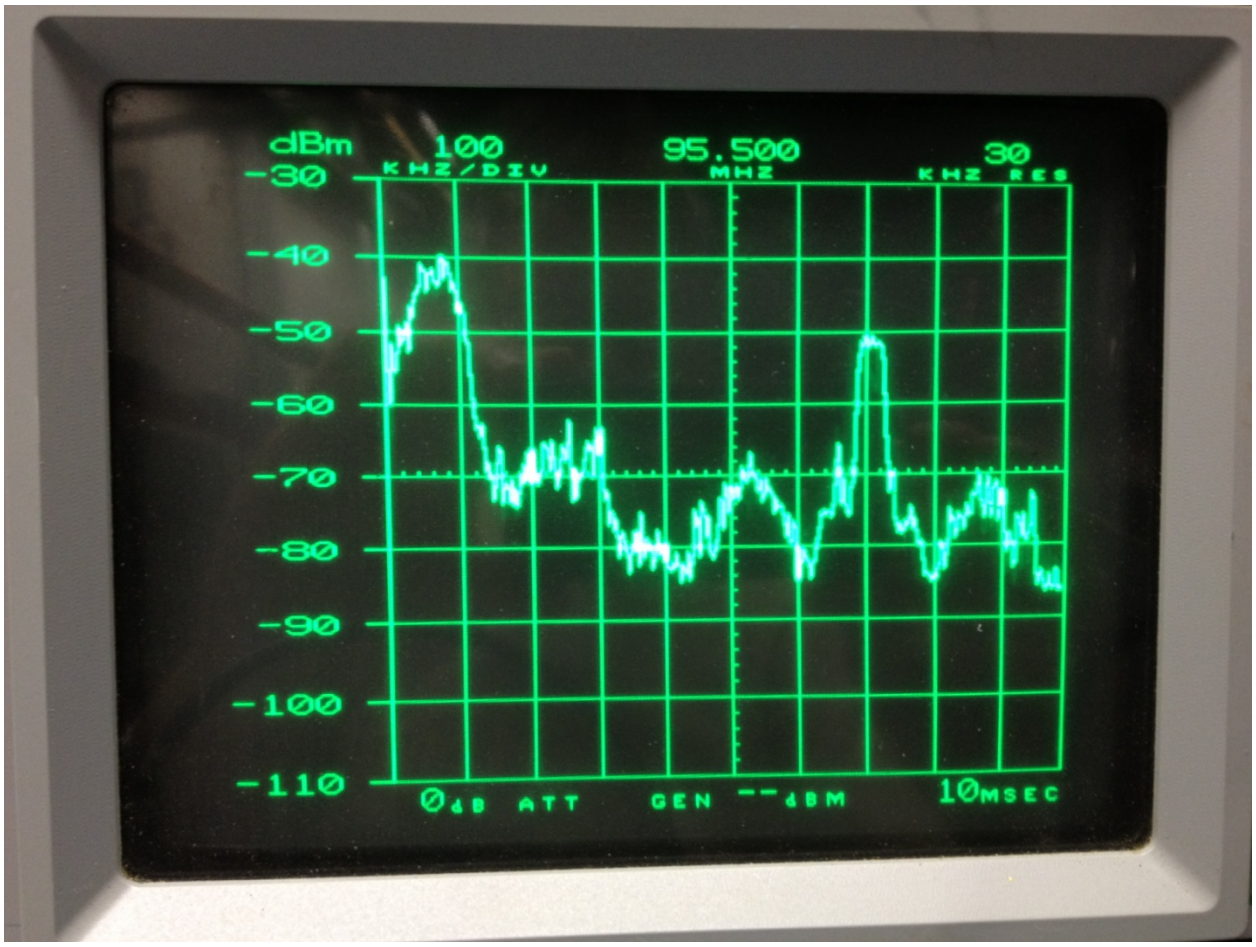
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 04 **92.9** **MHz** **-102 dB** **3C - 2D** **p. 12**



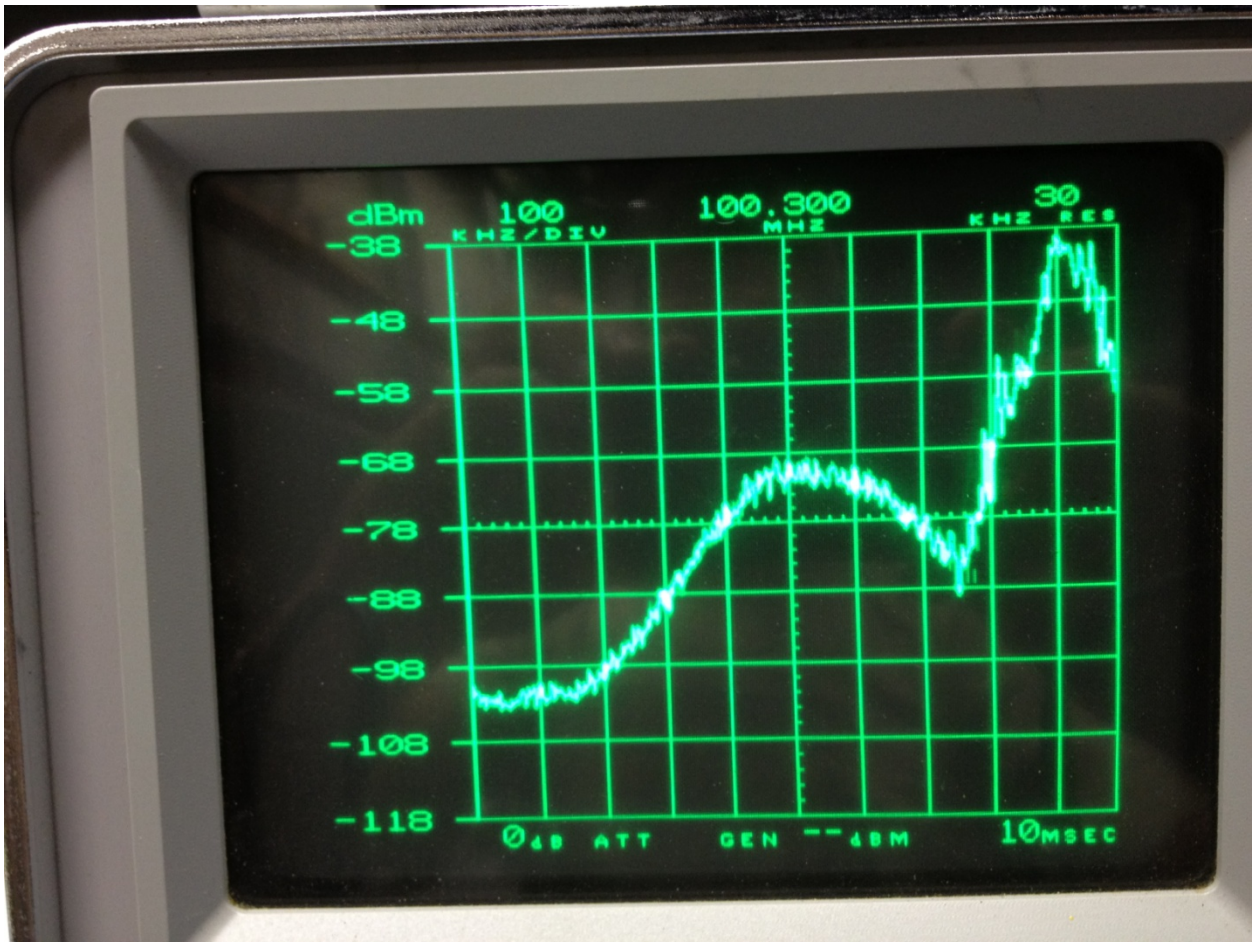
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 05 **95.5** **MHz** **-70 dB** **2C - D** **p. 13**



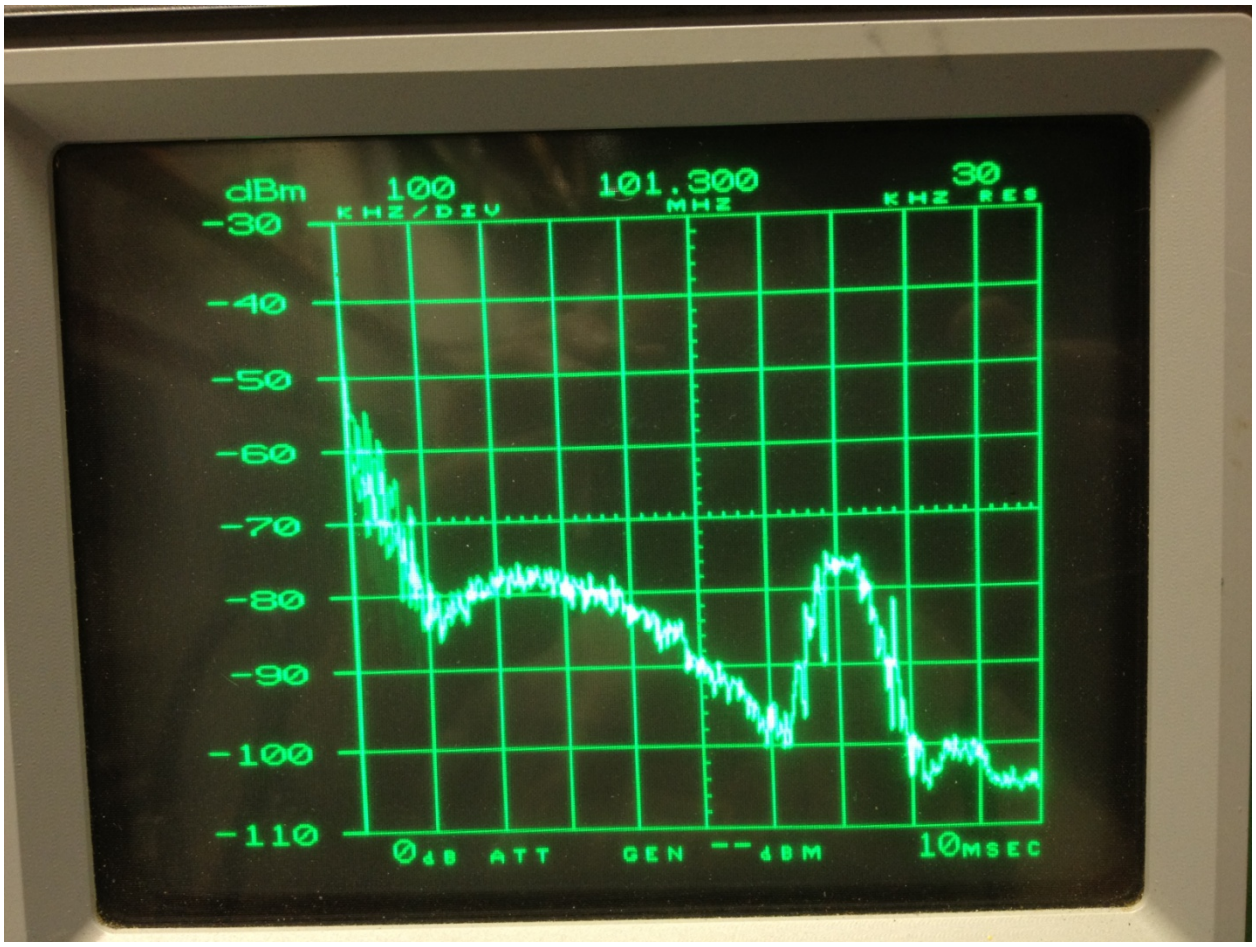
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 06 **100.3** **MHz** **-70 dB** **2B - A** **p. 14**



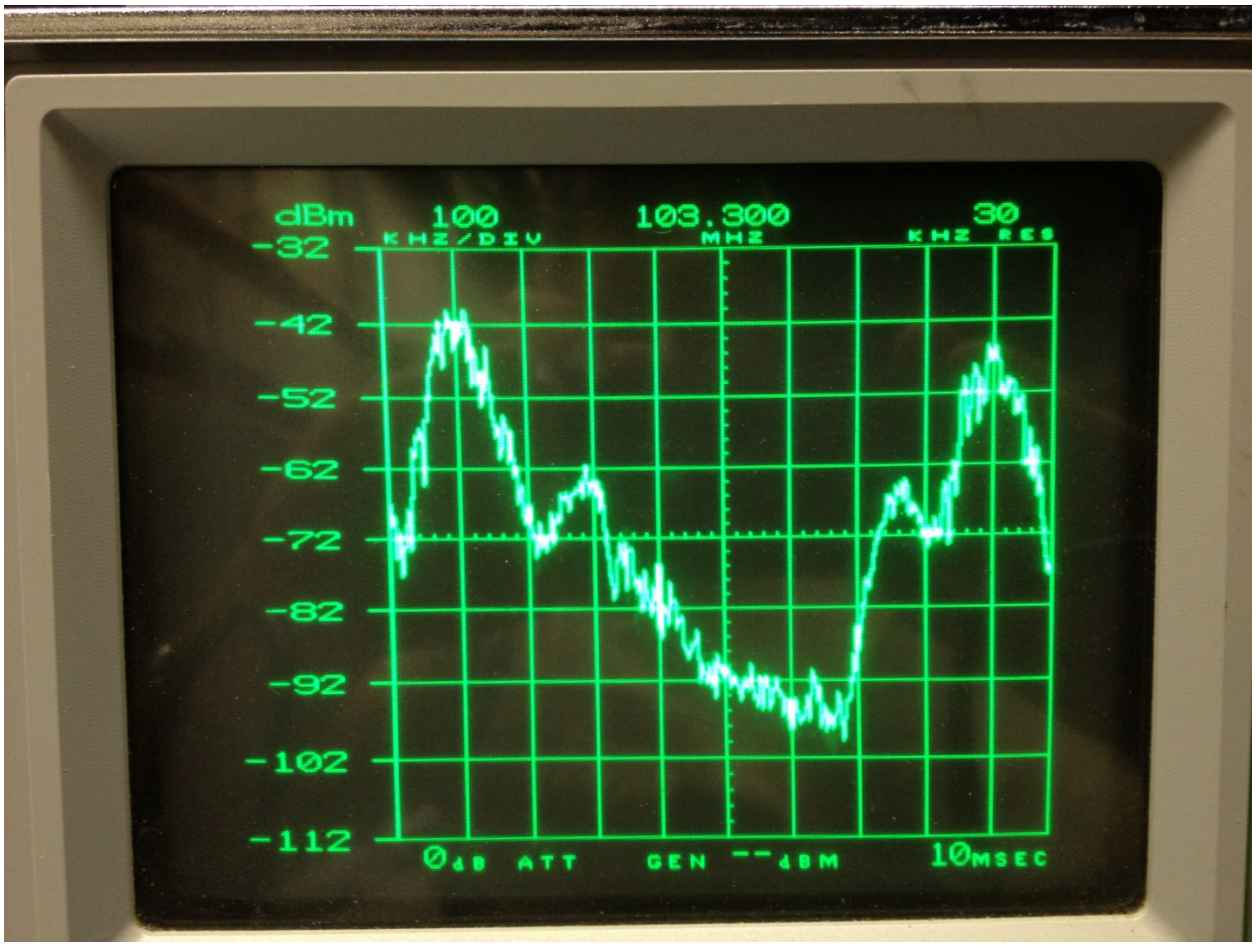
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 07 **101.3** **MHz** **-90 dB** **2C - B** **p. 15**



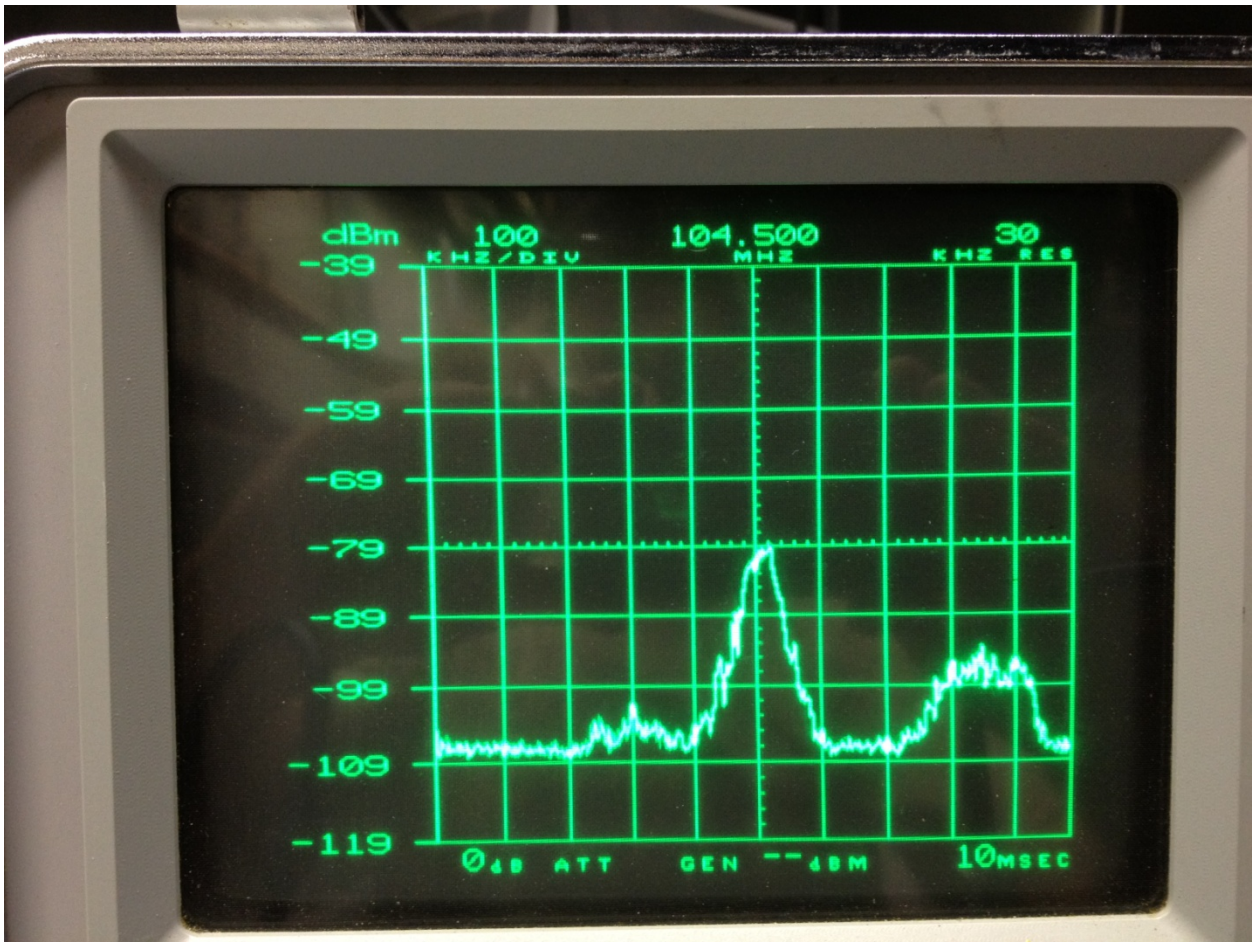
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 08 **103.3** MHz **-92 dB** **2D - C** p. 16



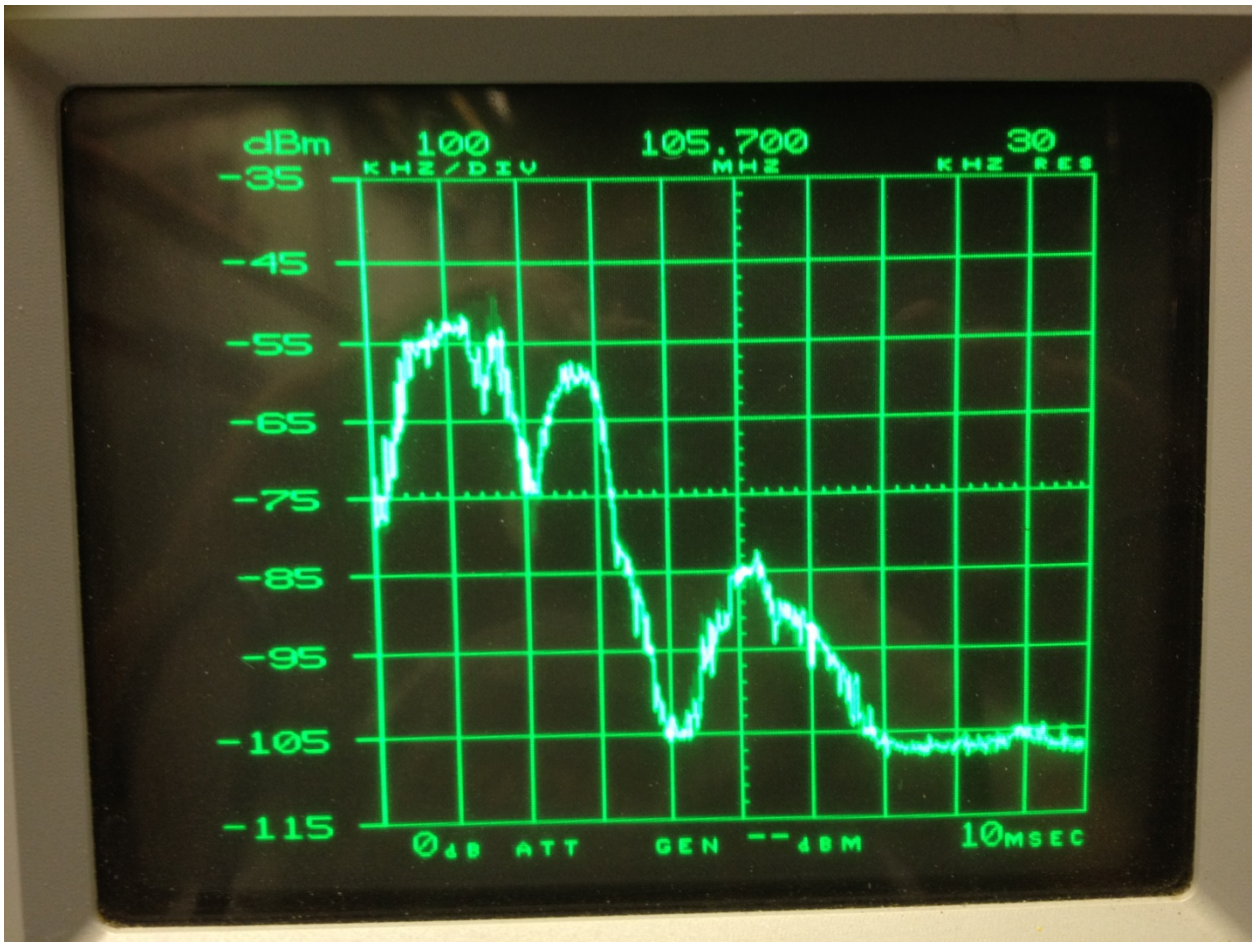
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 09 **104.5 MHz** **-79 dB** **3C - 2B** **p. 17**



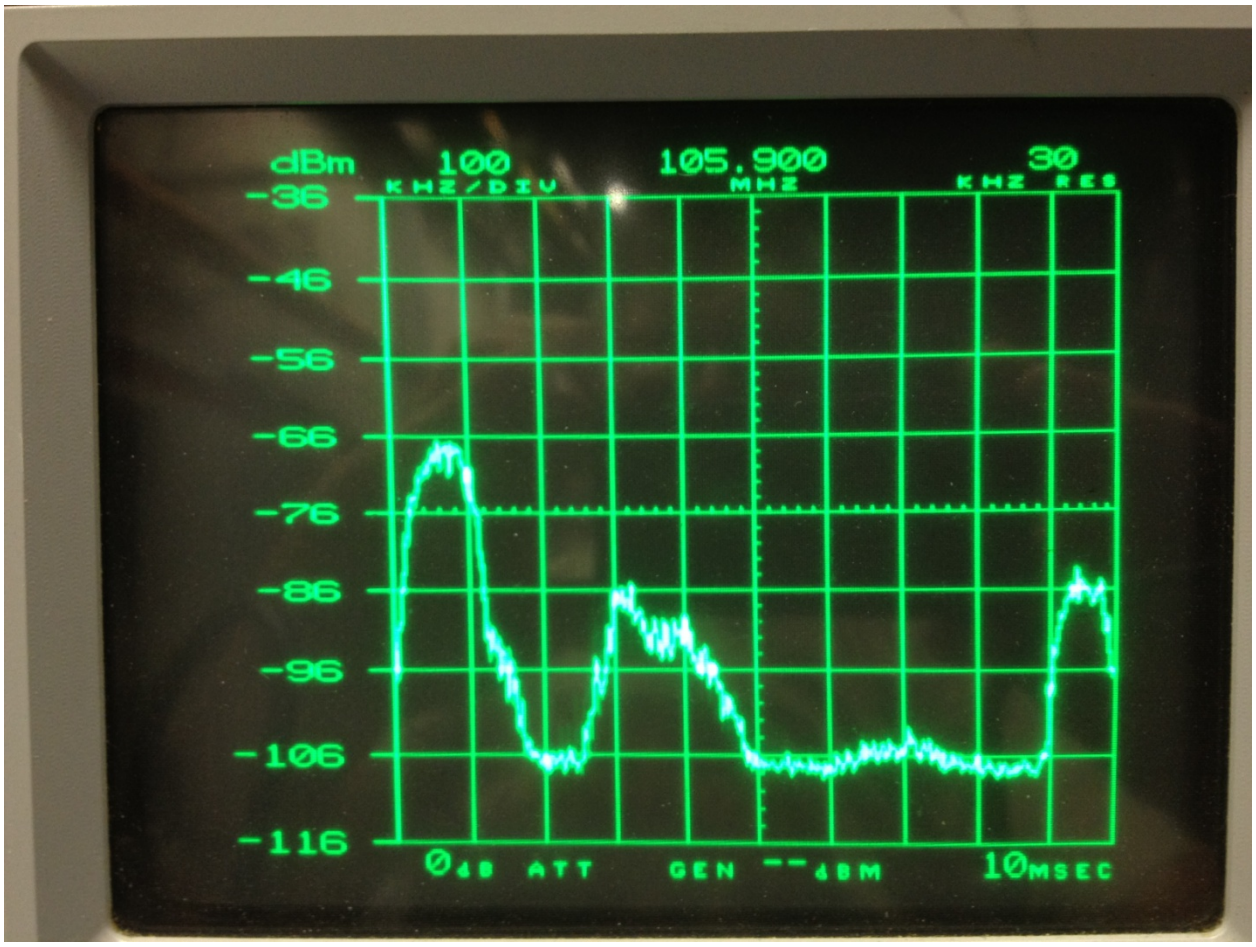
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 10 **105.7** **MHz** **-85 dB** **3B - 2A** **p. 18**



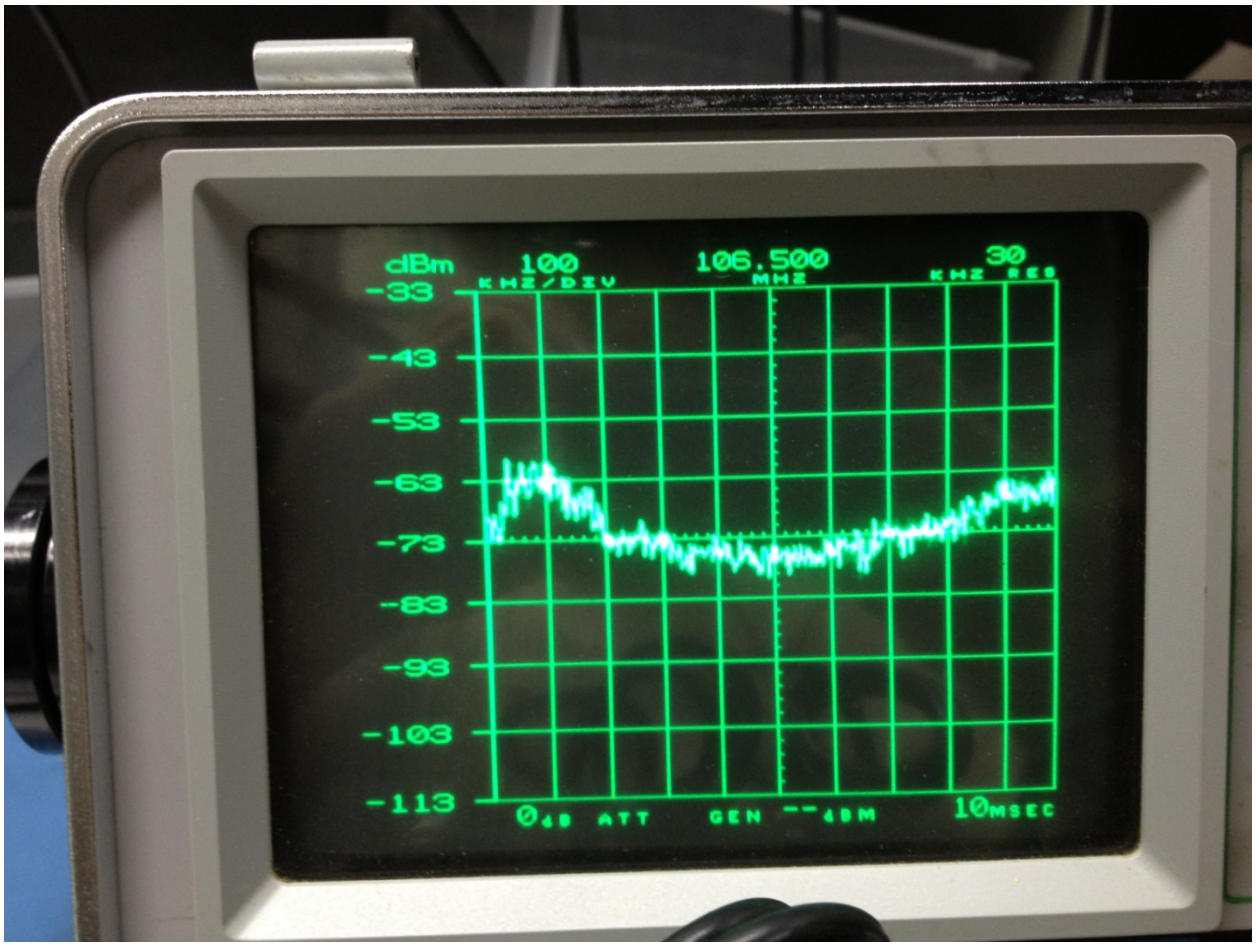
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 11 **105.9** **MHz** **-106 dB** **3D - 2C** **p. 19**



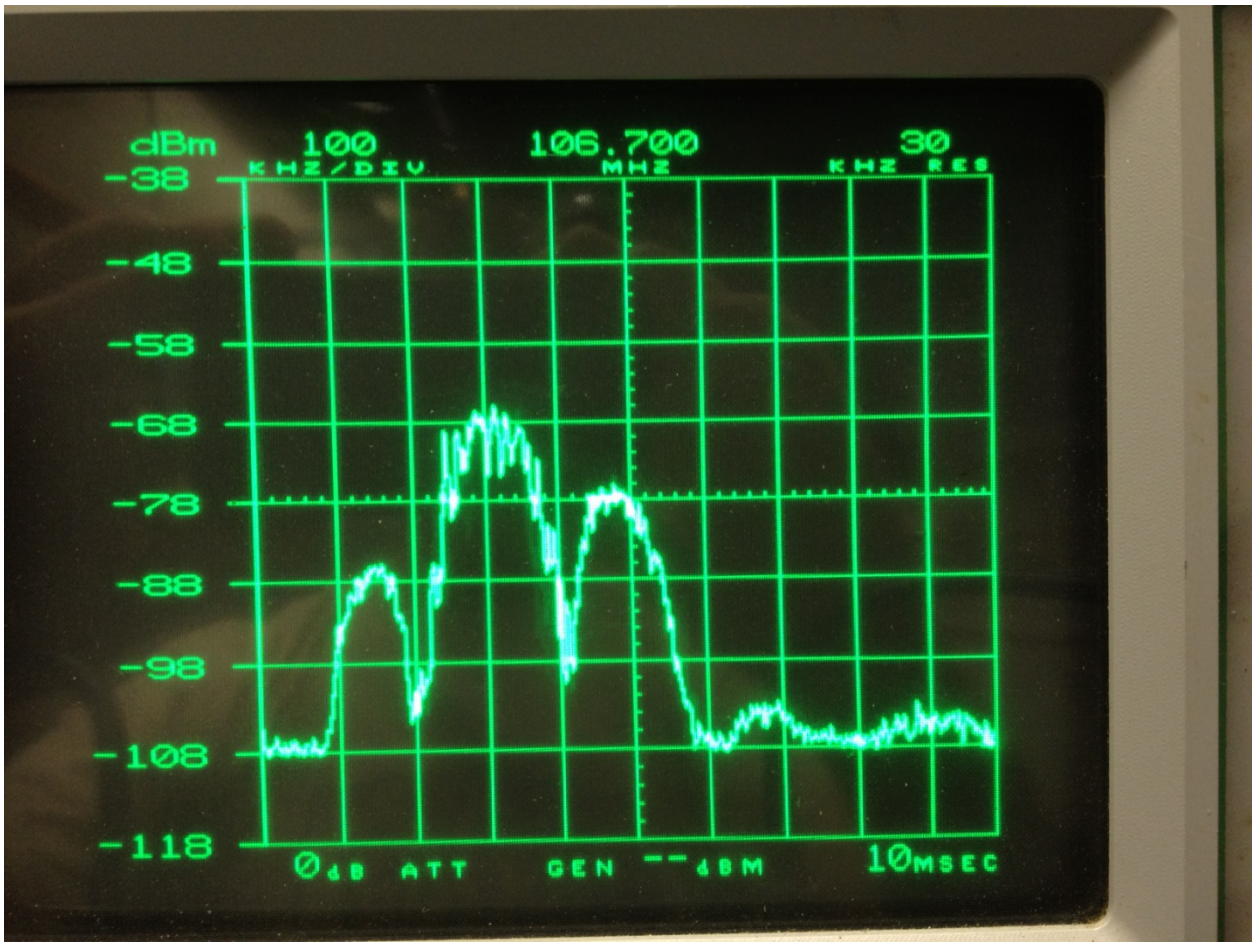
Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 12 **106.5** **MHz** **-73 dB** **2D - B** **p. 20**



Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7

A 13 **106.7** **MHz** **-78 dB** **2C - A** **p. 21**



Frequencies : A = 89.5 B = 94.9 C = 98.1 D = 100.7