

STEPHEN S. LOCKWOOD, PE, PMP

THOMAS M. ECKELS, PE
THOMAS S. GORTON, PE

JAMES B. HATFIELD, PE
BENJAMIN F. DAWSON III, PE
ERIK C. SWANSON, PE, PMP
DAVID J. PINION, PE
STEPHEN PUMPLE, M.Eng, MBA, PMP
CONSULTANTS

HATFIELD & DAWSON
CONSULTING ELECTRICAL ENGINEERS
9500 GREENWOOD AVE. N.
SEATTLE, WASHINGTON 98103

TELEPHONE (206) 783-9151
FACSIMILE (206) 789-9834
E-MAIL hatdaw@hatdaw.com

MAURY L. HATFIELD, PE
(1942-2009)
PAUL W. LEONARD, PE
(1925-2011)

ENGINEERING REPORT:

INTERMODULATION MEASUREMENTS

Prepared for
KJLP & K214FK

Palmer, Alaska

Christian Broadcasting, Inc.

August 2022

INTRODUCTION

Spectrum measurements intended to detect unwanted intermodulation products (spurious emissions) were made on the shared antenna system at the FM transmitting facility located on the west slope of Lazy Mountain off of T and T Lane in Palmer, Alaska. These measurements were made between 11:30 am – 12:30 pm on 3 August 2022. All stations on this system (KJLP and K214FK) were operating with licensed power with normal modulation while measurements were being made. Spectrum measurements were made to confirm that all operating stations comply with “§73.317 FM Transmission System Requirements”.

COMBINED ANTENNA MEASUREMENTS PROCEDURE

The measurements were made using a Keysight FieldFox RF Analyzer N9914B. This instrument includes a Vector Network Analyzer, Spectrum Analyzer, and a Cable Analyzer. This was connected to a sample from a directional coupler sample port (Bird ThruLine EIA 7/8 " ~ 55 dB) in the transmission line. This is shown in Figure 1. Additional high pass filters and attenuators were used to ensure that the Spectrum Analyzer was not producing any internal intermodulation products. This is shown in Figure 2.

Measurements were made with full FM modulation under normal programming. Particular attention was giving to harmonics and the predicted intermodulation products shown in table 1. Enclosed are example spectral graphs of the measurements of the occupied bandwidth. There were no harmonics or mix products that exceed the requirements as set forth in §73.317.

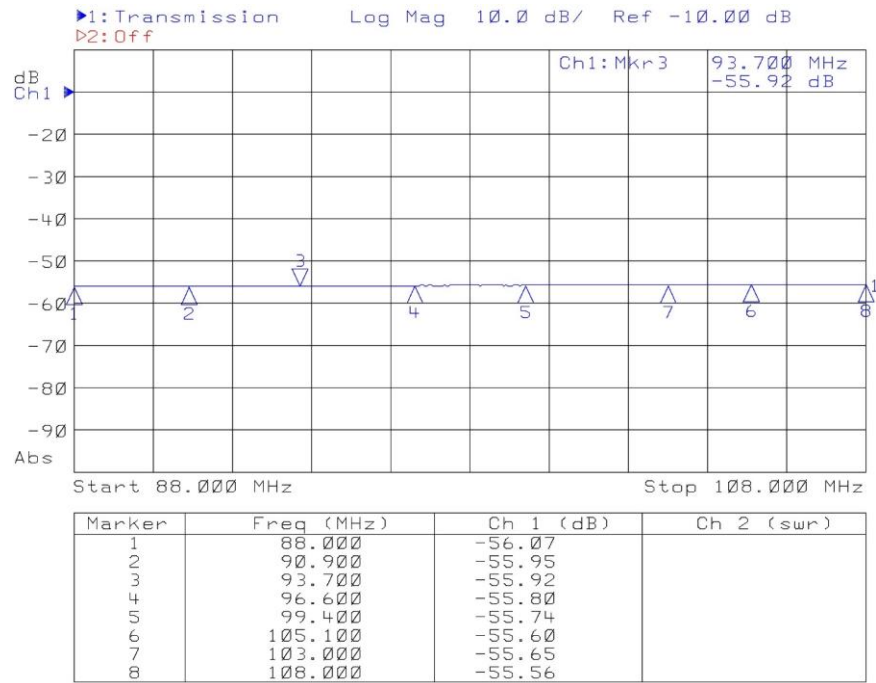


Figure 1 Bird Sample Element 75 - 150 MHz

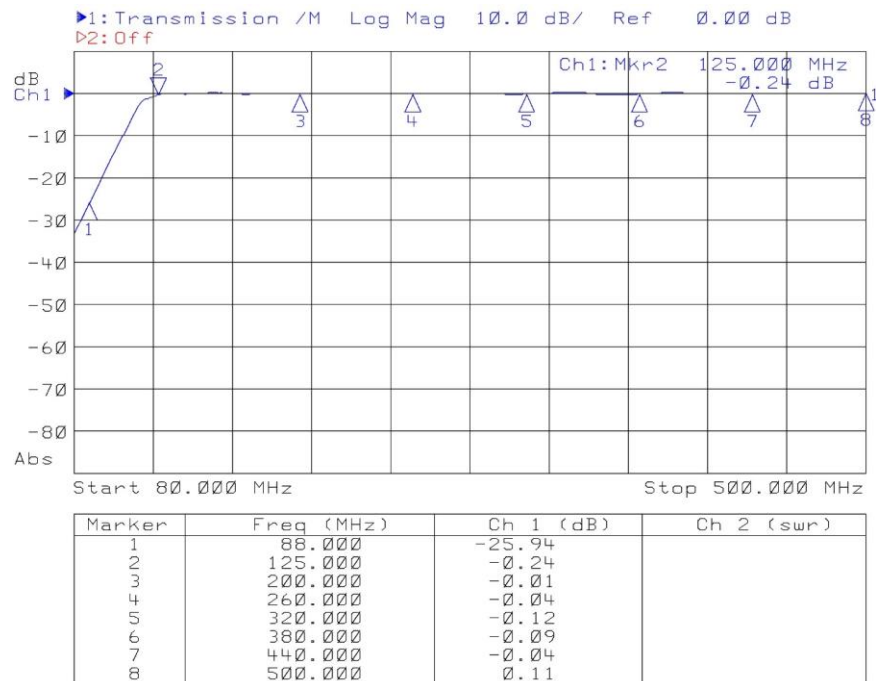
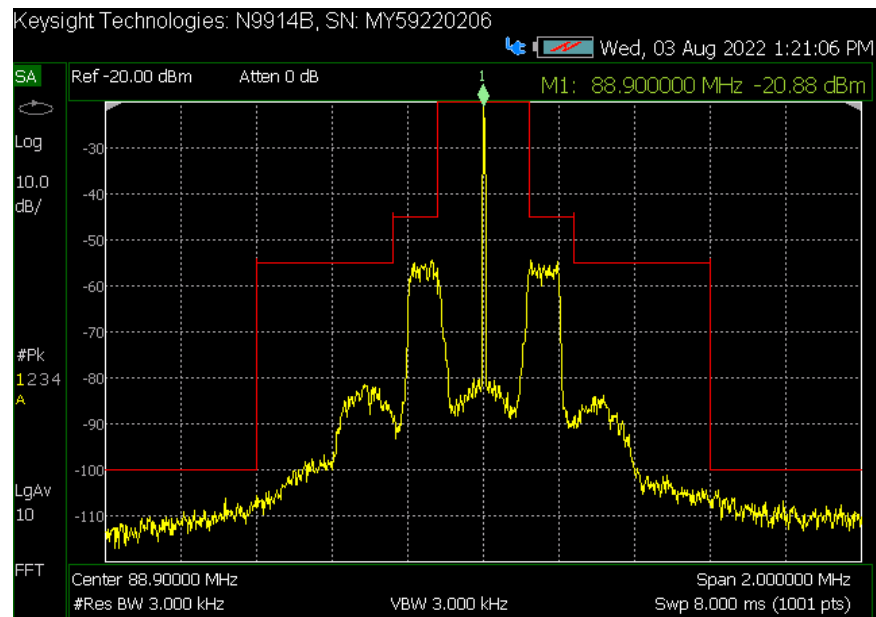
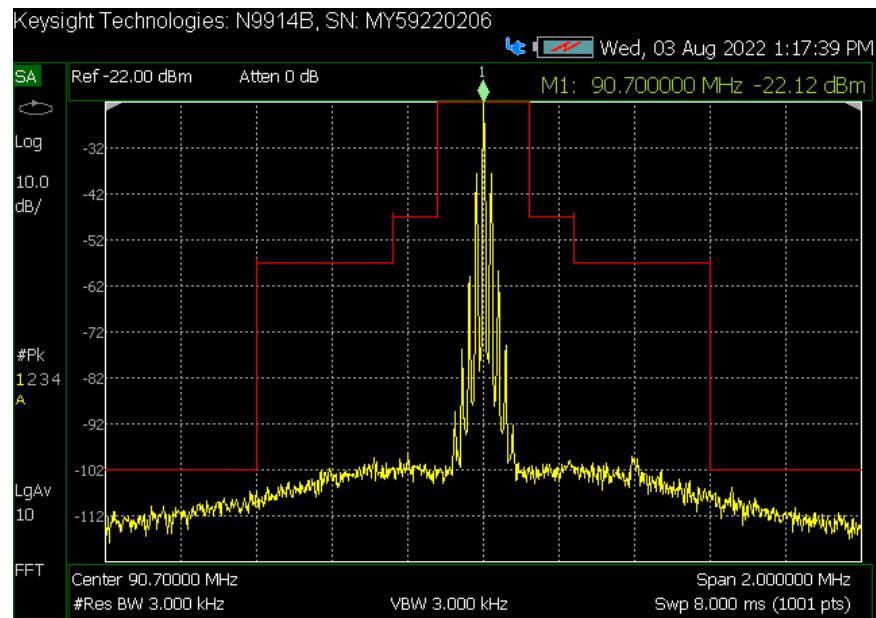


Figure 2 Mini Circuits HP-150

Table 1

Mult	x	Freq. (MHz)	Sum/Dif	Mult	x	Freq. (MHz)	=	Product (MHz)
2	x	90.7	-	1	x	88.9	=	92.5
3	x	90.7	-	2	x	88.9	=	94.3
3	x	88.9	-	1	x	90.7	=	176.0
2	x	88.9	=				=	177.8
1	x	88.9	+	1	x	90.7	=	179.6
1	x	90.7	+	1	x	88.9	=	179.6
2	x	90.7	=				=	181.4
3	x	90.7	-	1	x	88.9	=	183.2
3	x	88.9	=				=	266.7
1	x	90.7	+	2	x	88.9	=	268.5
2	x	88.9	+	1	x	90.7	=	268.5
1	x	88.9	+	2	x	90.7	=	270.3
2	x	90.7	+	1	x	88.9	=	270.3
3	x	90.7	=				=	272.1
1	x	90.7	+	3	x	88.9	=	357.4
3	x	88.9	+	1	x	90.7	=	357.4
2	x	88.9	+	2	x	90.7	=	359.2
2	x	90.7	+	2	x	88.9	=	359.2
1	x	88.9	+	3	x	90.7	=	361.0
3	x	90.7	+	1	x	88.9	=	361.0
2	x	90.7	+	3	x	88.9	=	448.1
3	x	88.9	+	2	x	90.7	=	448.1
2	x	88.9	+	3	x	90.7	=	449.9
3	x	90.7	+	2	x	88.9	=	449.9

*Figure 3 KJLP 88.9 MHz**Figure 4 K214FK 90.7 MHz*

CONCLUSION

All of the stations at this facility comply with requirements set forth in §73.317.

STATEMENT OF ENGINEER

This Engineering Report and spectral measurements have been prepared by me or under my direct supervision. All representations contained herein are true to the best of my knowledge. I am an experienced radio engineer whose qualifications are a matter of record with the Federal Communications Commission. I am a partner in the firm of Hatfield and Dawson Consulting Engineers and am Registered as a Professional Engineer in the States of Washington, Alaska and Wyoming.

5 August 2022

Stephen S. Lockwood, P.E.

