Technical Report

W227DS(CP)

Facility ID 201231

and

W260DI(FX)

Facility ID 201234

Intermodulation Performance Analysis of the Transmission Systems on Sand Mountain

8 October 2020

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This report outlines the results of an intermodulation study conducted on a combined station antenna system located near Wytheville on Sand Mountain. All calculated IMD product frequencies were found within legal tolerance.

An Aeroflex / IFR service monitor, Model 2945A, SN 294501-922, equipped with a spectrum analyzer and tracking generator, was used to conduct this study. The instrument was factory calibrated on 8 October 2020 The analyzer's antenna input port was connected to a sample port of a coupler section placed on the combiner network's output port.

The transmitters were operated at their respective 100% power output to achieve construction permit ERP, based on combiner and antenna system loss calculations.

Measurements were made using a 2MHz span for each target intercept, at a RBW of 3kHz, averaged over one minute. The instrument's noise floor was observed at -128.5dBm.

Care was taken to avoid IMD products from being produced within the instrument's front end. Notch filters (MFC B-6367-2) tuned to the two fundamentals were placed in line between the coupler and the analyzer to reduce internally-generated IMD products on frequencies of interest outside the FM band. Coupler and filter corrections were measured using the instrument's internal tracking generator. A third notch was pulled for a large signal imposed on the receiver on 101.9MHz, from a nearby translator station.

The measurements were made on 8 Octonber 2020, at approximately 1900 EDT. Temperature was 65F, clear skies, and no wind.

W227DS's transmitter is a Nautel VS300, S/N NARF64G 10002109.

W260DI's transmitter is a Nautel VS300, S/N NARF64G 10002719.

Each transmitter was connected to the combiner network with a six-foot coaxial jumper constructed Commscope FSJ4-50B cable.

The system's combiner network is a Nicom FSD-800 multi-cavity filter set, manufactured on 7 May 2018. This is coupled to a Nicom BKG-77 single bay antenna by was of RFS LCF5-50A cable.

A cellular base station was found operating nearby on 746.4MHz (7F1), which limited the IMD performance measurement range possible. The cellular signal was measured below -80dBc, which still allowed for positive certification of the translator diplex.

Detailed findings follow on the second page of this report.

Intermodulation Study for W227DS and W260DI
8 October 2020

W227DS

Worksheet 1

F1 **93.3** MHz

Fund. Harmonics	Result(F)	CpIr Corr.(dB)	Measured(dBm)	<-80dBc	$dB_{(F1)}$
2F1	186.6	-2.0	-125.5	TRUE	129.3
3F1	279.9	-2.0	-124.5	TRUE	128.3
4F1	373.2	-2.0	-128.0	TRUE	131.8
5F1	466.5	-3.5	-128.0	TRUE	130.3
6F1	559.8	-3.5	-128.5	TRUE	130.8
7F1	653.1	-5.0	-127.0	TRUE	127.8
8F1 (Cellular)	746.4	-6.0	-114.5	TRUE	114.3

F1 IMD	Result(F)			<-80dBc	$dB_{(F1)}$
IM2.1 (F2-F1)+F2	106.5	-2.0	-95.5	TRUE	99.3
IM1.2 (F2-F1)-F1	86.7	-2.0	-110.0	TRUE	113.8

F1 IMD Harmonics	Result(F)			<-80dBc	$dB_{(F1)}$
2IM2.1	213	-2.0	-128.5	TRUE	132.3
2IM1.2	173.4	-2.0	-128.5	TRUE	132.3

F1 Summaries	Result(F)			<-80dBc	$dB_{(F1)}$
F1+F2	193.2	-2.0	-128.0	TRUE	131.8

Intermodulation Study for W227DS and W260DI
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W260DI

Worksheet 2

F2 **99.9** MHz

Fund. Harmonics	Result(F)	CpIr Corr.(dB)	Measured(dBm)	<-80dBc	$dB_{(F1)}$
2F2	199.8	-2.0	-110.5	TRUE	109.5
3F2	299.7	-2.0	-123.0	TRUE	122.0
4F2	399.6	-2.0	-128.5	TRUE	127.5
5F2	499.5	-3.5	-128.0	TRUE	125.5
6F2	599.4	-3.5	-127.0	TRUE	124.5
7F2	699.3	-5.0	-127.0	TRUE	123.0
8F2	799.2	-6.0	-127.5	TRUE	122.5

As demonstrated, this system's emissions comply with 47CFR 73.317 (a) thru (d).

The preceding statements and data contained herein were prepared by me and are true and accurate to the best of my knowledge and belief.

Respectfully,

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8 October 2020