

Technical Report

W286DM(CP)

Facility ID 202089

and

W294CE(CP)

Facility ID 201254

Intermodulation Performance Analysis of the Transmission System at WPAQ(AM) Tower Site, Mt Airy, NC

14 July 2020

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This report outlines the results of an intermodulation distortion (IMD) study conducted on a combined station antenna system located in Mt Airy, NC, on the tower at WPAQ(AM).

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 15 February 2018. 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 -129.0dBm.

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.

The measurements were made on 14 July 2020, at approximately 1500 EDT. Temperature was 85F, clear skies, and no wind.

W286DM's transmitter is a Nautel VS-1, S/N 10012594.

W294CE's transmitter is a Nautel VS-1, S/N 10013183.

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

The system's combiner network is a Shivley Labs, 6916-3 multi-cavity filter set. This is coupled to a Nicom BKG-77 four-bay antenna by way of RFS LCF78 cable, and a Kintronic Labs Isocoil in that line.

Detailed tabulated findings follow on the subsequent pages of this report.

Intermodulation Study for W286DM and W294CE
14 July 2020

W286DM

F3 105.1 MHz					
Fund. Harmonics	<i>Result(F)</i>	<i>Cplr Corr.(dB)</i>	<i>Measured(dBm)</i>	<-80dBc	<i>dB_(F1)</i>
2F3	210.2	-2.0	-125.0	TRUE	133.0
3F3	315.3	-2.0	-93.5	TRUE	101.5
4F3	420.4	-2.0	-129.0	TRUE	137.0
5F3	525.5	-2.0	-93.5	TRUE	101.5
6F3	630.6	-2.0	-126.0	TRUE	134.0
7F3	735.7	-6.0	-126.5	TRUE	130.5
8F3	840.8	-6.0	-125.0	TRUE	129.0
F3 IMD					
	<i>Result(F)</i>			<-80dBc	<i>dB_(F1)</i>
<i>IM4.3 (F4-F3)+F4</i>	108.3	-2.0	-93.0	TRUE	101.0
<i>IM3.4 (F4-F3)-F3</i>	103.5	-2.0	-101.5	TRUE	109.5
F3 IMD Harmonics					
	<i>Result(F)</i>			<-80dBc	<i>dB_(F1)</i>
2IM4.3	216.6	-2.0	-128.0	TRUE	136.0
2IM3.4	207	-2.0	-128.0	TRUE	136.0
3IM4.3	324.9	-2.0	-128.5	TRUE	136.5
3IM3.4	310.5	-2.0	-127.0	TRUE	135.0
F3 Summaries					
	<i>Result(F)</i>			<-80dBc	<i>dB_(F1)</i>
F3+F4	211.8	-2.0	-113.0	TRUE	121.0

Intermodulation Study for W286DM and W294CE
14 July 2020

W294CE

F4 106.7 MHz

Fund. Harmonics	Result(F)	Cplr Corr.(dB)	Measured(dBm)	<-80dBc	$dB_{(F1)}$
2F4	213.4	-2.0	-91.0	TRUE	98.5
3F4	320.1	-2.0	-84.0	TRUE	91.5
4F4	426.8	-2.0	-126.0	TRUE	133.5
5F4	533.5	-2.0	-122.0	TRUE	129.5
6F4	640.2	-2.0	-128.0	TRUE	135.5
7F4	746.9	-6.0	-125.0	TRUE	128.5
8F4	853.6	-6.0	-127.5	TRUE	131.0

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14 July 2020

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,

Joshua M. Arritt
J. M. Arritt Broadcast Technical Service
14 July 2020