Truck Coder II
Audio Response Measurement
for
FCC Type Certification

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Author: L Greenbank

Revision History

Date	Author	Description of changes	Revision
2/20/2007	L Greenbank	Initial release	--

L Greenbank

Table of Contents

1. Introduction

This document records the audio frequency response of the Truck Coder II up to and including the Subcarrier generation, in response to the TCB review at NEMCO, Canada. ……..

2. Scope

Most of the type certification data was taken by NEMCO. This additional audio measurement data was taken at BMS to supplement the application for type certification. It includes audio gain and frequency response in analog mode for the two rear panel audio inputs on the IDU of the Truck Coder II system.

3. Definitions

Term	Definition
ODU	Outdoor Unit
IDU	Indoor Unit
BW	Bandwidth
FM	Frequency Modulation
OFDM	Orthogonal Frequency Division Multiplex
TCII	Truck Coder II
BMS	Broadcast Microwave Services
FCC	Federal Communications Commission
TCB	Type Certification Board
NEMCO	

4. References

[1] 47 CFR Part 2, July, 1998

§ 2.1047 Measurements required: Modulation characteristics.
(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation

versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
(c) *Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.* A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of § 2.1049 for the occupied bandwidth tests.
(d) *Other types of equipment.* A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.
[39 FR 5919, Feb. 15, 1974. Redesignated and amended at 63 FR 36599, July 7, 1998]

5. Equipment

[1] Agilent HP8903A Audio Analyzer
[2] Agilent HP8901A Modulation Analyzer
[3] Ballantine 323 True RMS AC voltmeter

6. Test Procedures

Standard production test procedures and test data sheets were reviewed and compiled for this report. A random sample of three units are reported. All IDUs are 100% tested for gain and frequency response.

Each channel was tested separately with sine inputs into the rear panel of the IDU. The FM audio subcarriers were sampled at Test points provided within the IDU, and demodulated by test equipment.

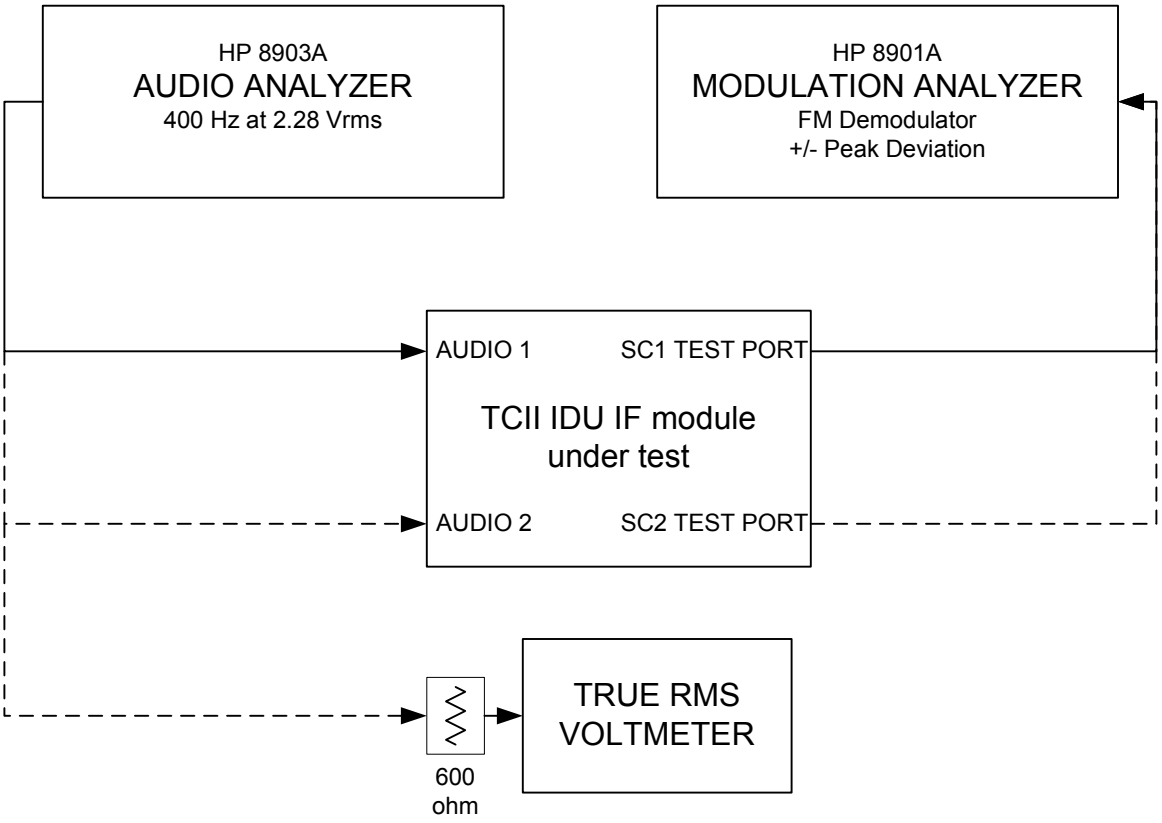
Gain was measured as the peak FM deviation due to a fixed audio input voltage. Of +9 dBm into 600 ohms which is equivalent to 2.28 Vrms. This is the maximum specified input level. Gain was measured at each of the standard subcarrier frequencies for audio channel 1 and channel 2.

The frequency response was measured after FM demodulation and after 75 us deemphasis. The audio input level was set to 20 dB below the peak, or 228 mVrms, to avoid saturation after preemphasis at high frequencies. Frequency response was measured in dB relative to 400 Hz. The subcarrier selected for audio frequency response measurement was the lowest standard frequency for each channel—4.83 MHz for audio 1, or 5.8 MHz for audio 2.

6.1. Audio Gain

Subcarrier deviation measurements with 400Hz sine input at an amplitude of 2.183Vrms, equivalent to +9dBm into 600 ohms.

6.1.1. Setup



AUDIO GAIN TEST SETUP

6.1.2. Measurement Data

SN2028 SC1 Deviation	Frequency [MHz]	Deviation [KHz] *Measured*	
	4.83	68	KHz
	5.8	83.0	KHz
	6.2	80.5	KHz
	6.8	67.0	KHz

SN2029 SC1 Deviation	Frequency [MHz]	Deviation [KHz] *Measured*	
	4.83	68	KHz
	5.8	84.3	KHz
	6.2	83.3	KHz
	6.8	71.7	KHz

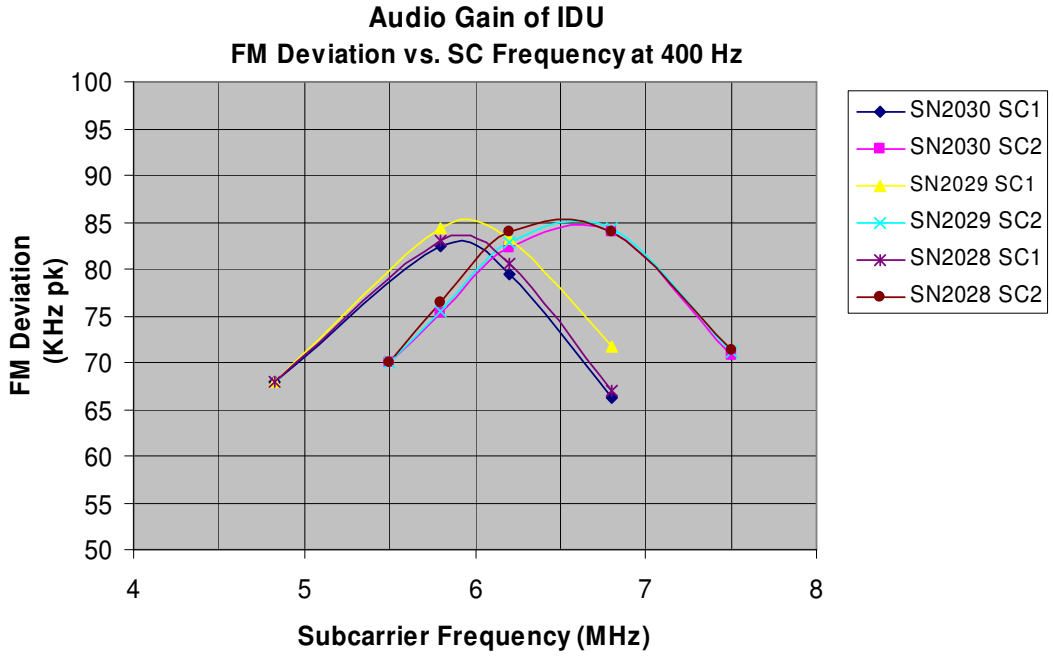
SN2030 SC1 Deviation	Frequency [MHz]	Deviation [KHz] *Measured*	
	4.83	68	KHz
	5.8	82.5	KHz
	6.2	79.4	KHz
	6.8	66.2	KHz

SN2028 SC2 Deviation	Frequency [MHz]	Deviation [kHz] *Measured*	
	5.5	70	KHz
	5.8	76.5	KHz
	6.2	83.9	KHz
	6.8	84.0	KHz
	7.5	71.3	KHz

SN2029 SC2 Deviation	Frequency [MHz]	Deviation [kHz] *Measured*	
	5.5	70	KHz
	5.8	75.5	KHz
	6.2	82.9	KHz
	6.8	84.4	KHz
	7.5	71.2	KHz

SN2030 SC2 Deviation	Frequency [MHz]	Deviation [kHz] *Measured*	
	5.5	70	KHz
	5.8	75.2	KHz
	6.2	82.3	KHz
	6.8	84.0	KHz
	7.5	70.7	KHz

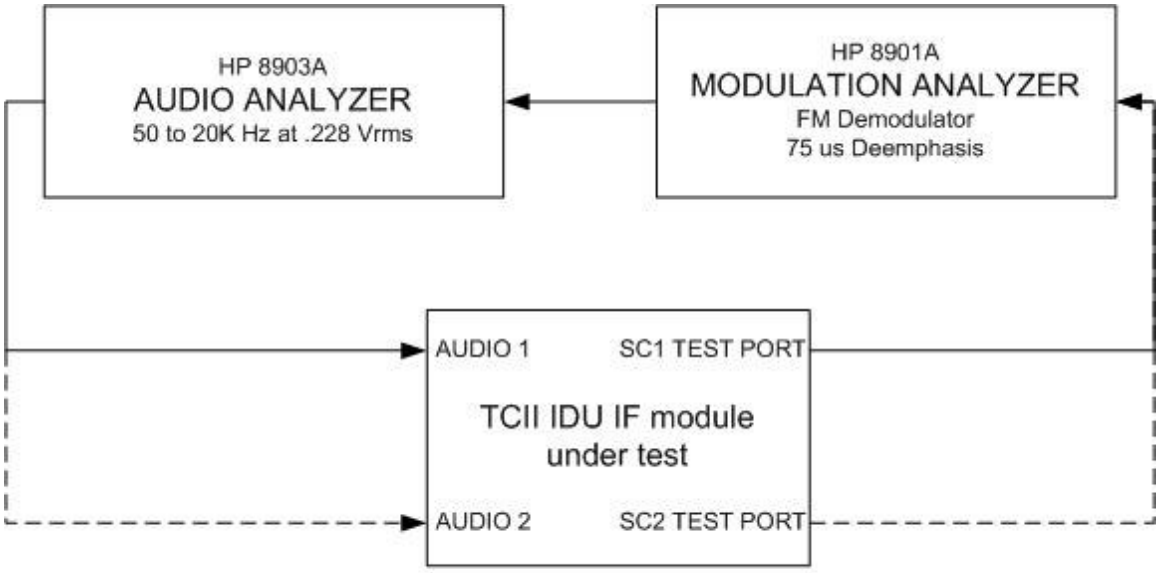
6.1.3. Gain plot (peak deviation)



6.2. Audio Frequency Response

Subcarrier frequency response measurements after FM demodulator and deemphasis, with 400Hz sine modulation with amplitude of 0.22Vrms, equivalent to -11dBm into 600 ohms. Frequency response is specified from 50

6.2.1. Setup



AUDIO RESPONSE TEST SETUP

6.2.2. Measurement Data

SN2028 SC1 Audio Frequency Response	Frequency [Hz]	Response *Measured*	[dB]
	20	-2.66	dB
	50	-0.17	dB
	400	0.00	dB
	2K	0.06	dB
	10K	0.02	dB
	20K	-0.32	dB

SN2028 SC2 Audio Frequency Response	Frequency [Hz]	Response *Measured*	[dB]
	20	-2.67	dB
	50	-0.19	dB
	400	0.00	dB
	2K	0.02	dB
	10K	-0.03	dB
	20K	-0.26	dB

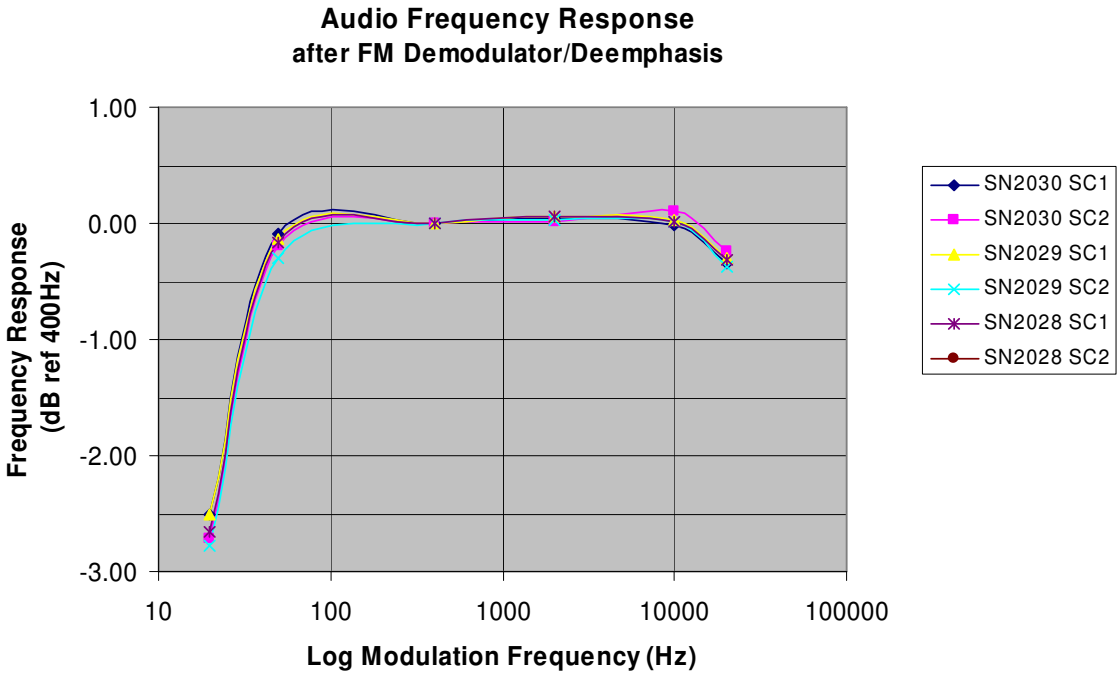
SN2029 SC1 Audio Frequency Response	Frequency [Hz]	Response *Measured*	[dB]
	20	-2.50	dB
	50	-0.14	dB
	400	0.00	dB
	2K	0.06	dB
	10K	0.03	dB
	20K	-0.30	dB

SN2029 SC2 Audio Frequency Response	Frequency [Hz]	Response *Measured*	[dB]
	20	-2.78	dB
	50	-0.30	dB
	400	0.00	dB
	2K	0.03	dB
	10K	0.01	dB
	20K	-0.37	dB

SN2030 SC1 Audio Frequency Response	Frequency [Hz]	Response *Measured*	[dB]
	20	-2.50	dB
	50	-0.09	dB
	400	0.00	dB
	2K	0.04	dB
	10K	-0.01	dB
	20K	-0.34	dB

SN2030 SC2 Audio Frequency Response	Frequency [Hz]	Response *Measured*	[dB]
	20	-2.71	dB
	50	-0.19	dB
	400	0.00	dB
	2K	0.02	dB
	10K	0.10	dB
	20K	-0.24	dB

6.2.3. Plot of Frequency Response



7. Appendix

7.1. Supplemental plots--Layout view