FCC CERTIFICATION TEST REPORT

for

AutoVision Enterprises, Inc.
8126 US Highway 98 N
Lakeland, FL 33809

FCC ID: OR2AVTRANSTR101

February 2, 2000

WLL PROJECT #: 5583X

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AutoCinema™
with Sound-A-Round ©

Chief, Authorizations Branch
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD. 21046

RE: LETTER OF AGENCY

This letter is to serve notice that Washington Laboratories, Ltd. Is hereby authorized to act on our behalf in connection with the Application for Equipment Authorization attached herewith.

We certify that we are not subject to denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse ACT of 1998, U.S.C. 862. Further, no party, as defined in 47 CFR 1.2002(b), to the application is subject to denial of federal benefits, that includes FCC benefits.

Signed,

Christopher J. Vitito

President

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STATEMENT OF QUALIFICATIONS

for

Herbert W. Meadows

Washington Laboratories, Ltd.

I hold a Bachelor of Science in Electronics Engineering Technology. I have over three years of EMI testing experience and nine years of RF and microwave testing experience. I am qualified to perform EMC testing to the methods described in this test report. The measurements taken within this report are accurate within my ability to perform the tests and within the tolerance of the measuring instrumentation.

By: Herbert W. Meadows
Herbert W. Meadows
Compliance Engineer

Date: February 2, 2000

FCC CERTIFICATION TEST REPORT

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FCC ID: OR2AVTRANSTR101

1.0 Introduction

This report has been prepared on behalf of AutoVision Enterprises, Inc. to support the attached Application for Equipment Authorization. The test and application are submitted for an Intentional Radiator under Part 15.239 of the FCC Rules and Regulations. The Equipment Under Test was a FM Transmitter which operates from 87.9MHz to 89.5MHz. Refer to correspondence, submitted electronically as a Cover Letter Attachment, between Elite Electronic Engineering and the FCC allowing the use of the 87.9 MHz frequency.

All measurements herein were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and field Strength Instrumentation. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

All measurements are performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

All results reported herein relate only to the equipment tested. The measurement uncertainty of the data contained herein is ±2.3 dB. Refer to Appendix A for Statement of Measurement Uncertainty. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government.

1.1 Summary

After the implementation of the modification listed in Appendix B, the AutoVision Enterprises, Inc. FM Transmitter complies with the limits for an Intentional Radiator under Part 15.239 of the FCC Rules and Regulations.

2.0 Description of Equipment Under Test (EUT)

The AutoVision Enterprises, Inc. transmitter (EUT) is an FM transmitter used for transmitting audio from a VCR/TV to a vehicle radio so that the audio may be heard over the automobile speakers. The unit transmits at 87.9MHz to 89.5MHz but is factory set to 87.9MHz.

2.1 On-board Oscillators

The AutoVision Enterprises, Inc. transmitter contains a 16MHz oscillator:

3.0 Test Configuration

To complete the test configuration required by the FCC, the transmitter was tested in all three orthogonal planes. All testing was performed at 12VDC.

I/O Ports	I/O Cables
Audio Input L	Shielded (braid), 2m, Audio In Left
Audio Input R	Shielded (braid), 2m, Audio In Right

3.1 Testing Algorithm

The transmitter was turned on and constantly transmitting. The system was tested in all three orthogonal planes. The transmitter was tested at the lowest, middle and highest frequency of the selectable range. Worst case emissions are recorded in the data tables.

3.2 Conducted Emissions Testing

Conducted emissions testing was not performed as the unit is DC powered.

3.3 Radiated Emissions Testing

The EUT was placed on an 80 cm high 1 x 1.5 meters non-conductive motorized turntable for radiated testing on a 3 meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Biconical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. The measurement bandwidth on the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

3.3.1 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Table 1. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dbμV to obtain the Radiated Electric Field in dBμV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Voltage:	VdBμV
Composite Antenna Factor:	AFcdB/m
Electric Field:	EdBμV/m = VdBμV + AFcdB/m
To convert to linear units:	EμV/m = antilog (EdBμV/m/20)

Worst case emissions data was detected at 87.9 MHz operation and the data is recorded in Table 1.

Table 1

FCC 15.239 3M Radiated Emissions Data – Site 2

CLIENT: AutoVision Enterprises, Inc.
FCC ID: OR2AVTRANSTR101
DATE: 12/2/99
BY: Herb Meadows
JOB #: 5583X

FREQ MHz	POL H/V	Azimuth Degree	Ant Height m	SA LEVEL (QP) dBuV	AFc dB/m	E-FIELD dBuV/m	E-FIELD uV/m	LIMIT uV/m	MRGN dB
87.90	V	0.00	1.0	30.4	10.6	41.0	111.6	250.0	-7.0
87.90	H	67.50	1.0	33.5	10.6	44.1	159.4	250.0	-3.9
175.80	H	180.00	1.0	18.9	11.1	30.0	31.4	150.0	-13.6
175.80	V	270.00	1.0	13.2	11.1	24.3	16.3	150.0	-19.3
263.70	H	225.00	1.0	8.7	14.9	23.6	15.1	200.0	-22.4
263.70	V	135.00	1.0	13.3	14.9	28.2	25.7	200.0	-17.8
439.50	V	270.00	1.0	8.2	19.5	27.7	24.3	200.0	-18.3

Table 2

System Under Test

FCC ID: OR2AVTRANSTR101

EUT: AutoVision Enterprises, Inc. RF Transmitter; M/N: 87.9MHz RF Transmitter; S/N: N/A; FCC ID: OR2AVTRANSTR101

Power Supply: BK Precision; M/N: 1610; S/N: 145-08674

Table 3

Interface Cables Used

Shielded I/O cables were used throughout the system under test.

The EUT was powered via a non-shielded DC power cord.

Table 4

Measurement Equipment Used

The following equipment is used to perform measurements:

Hewlett-Packard Spectrum Analyzer: HP8564E
Hewlett-Packard Spectrum Analyzer: HP8568B
Hewlett-Packard Spectrum Analyzer: HP8593A
Hewlett-Packard Quasi-Peak Adapter: HP85650A
Hewlett-Packard Preselector: HP85685A
Hewlett-Packard Preamplifier: HP8449B
Antenna Research Associates, Inc. Biconical Log Periodic Antenna: LPB-2520A (Site 2)
Antenna Research Associates, Inc. Horn Antenna: DRG-118/A
Solar 50 Ω/50 μH Line Impedance Stabilization Network: 8012-50-R-24-BNC
Solar 50 Ω/50 μH Line Impedance Stabilization Network: 8028-50-TS-24-BNC
AH Systems, Inc. Portable Antenna Mast: AMS-4 (Site 2)
AH Systems, Inc. Motorized Turntable (Site 2)
RG-214 semi-rigid coaxial cable
RG-223 double-shielded coaxial cable

Appendix A

Statement of Measurement Uncertainty

For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:
A = Antenna calibration uncertainty, in dB = 2 dB
B = Spectrum Analyzer uncertainty, in dB = 1 dB
C = Site uncertainty, in dB = 4 dB
n = number of factors in uncertainty calculation = 3

Thus, total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

Appendix B

Modifications

The following modifications were made, in addition to the production modifications, to the AutoVision Enterprises, Inc. 87.9MHz RF transmitter in order for it to comply with the radiated emissions requirements:

1. The transmitting antenna was shortened to one inch.

2. A 12pF capacitor was added from the antenna output port to the DC common port.