

ENGINEERING STATEMENT
In Regard to Measurements on
AUDIO-TECHNICA U.S., INC.

MODEL: ESW-R220

FCC ID: JFZR220

A. INTRODUCTION

Hyak Laboratories, Inc. has been authorized by Audio Technica to perform measurements on a receiver to determine compliance with FCC rules, Part 15, Subpart B.

The receiver operates in the 728 - 741 MHz band and is intended for use with a wireless microphone.

B. DESCRIPTION OF RECEIVER

The receiver incorporates a dual diversity, dual conversion, super-heterodyne design.

The following information is supplied as requested in FCC Bulletin OCE 24:

1. Service in which the receiver will be used: Part 15. (74).
2. Function of receiver: Wireless Microphone Receiver.
3. Tuning range: 728 - 741 MHz.
4. IF used: 54.25 MHz, 10.7
5. Fundamental frequency of principal oscillators in the receiver.

First local oscillator: $(F_0 + 54.25)$ MHz (PLL).

Second local oscillator 43.55 MHz.

C. DESCRIPTION OF MEASUREMENT FACILITIES

A description of the Hyak Laboratories' radiation test facility is a matter of record with the FCC. The facility

was accepted for radiation measurements from 30 to 1000 MHz on October 1, 1976, and is currently listed as an accepted site.

D. DESCRIPTION OF MEASUREMENT PROCEDURE: RADIATED EMISSIONS

Measurements of receiver radiation field strength were made using ANSI C63.4 (1992) the basic procedure. Measurements were made with 3 meter spacing between the receiver under test and the test equipment antenna. The antenna(s) connected to the receiver under test consisted of vertically polarized, antennas approximately 5 cm long.

The receiver under test was placed on a rotatable table 80 cm in height.

Measurement of field strength was made through use of a Tektronix 494P spectrum analyzer in conjunction with Singer DM-105A series or EMC0 3221 calibrated dipoles or EMC0 3115 DRG horn.

For each spurious emission identified between 30 to 2000 MHz, the test sample was rotated for maximum pickup, the test antenna varied in elevation, and the test antenna polarization shifted between horizontal to vertical in order to maximize observed signals.

E. REPORT OF RADIATED EMISSIONS

Table 1 lists the frequency and amplitude of all signals observed from 30 to 2000 MHz that were within 20 dB of the limits of paragraph 15.109 of the FCC Rules for lower, mid and upper operating channels.

TABLE 1

RADIATED SPURIOUS EMISSIONS
Measured at 3 meters
PART 15(B) PARA. 15.109

Frequency Frequency

<u>To Which Tuned (MHz)</u>	<u>of Emission (MHz)</u>	<u>Meter Reading (dBm)</u>	<u>Antenna Factor (dB)</u>	<u>Field¹ Intensity uV/m @ 3m</u>	<u>FCC Limit uV/m @ 3m</u>	<u>dB to Limit</u>
728.125	782.376	-86.8	20.9	114	200	-4.9
734.386	788.626	-87.2	20.9	108	200	-5.3
740.540	794.753	-87.2	20.9	108	200	-5.3
All*	794.630	-93.6	20.9	52	200	-12

Note 1: $\text{uV/m} = \text{Log}_{20}^{-1\text{dBu/m}}$

dBu = dBm + antenna factor + 107

*Present independent of channel frequency

RADIATED SPURIOUS EMISSIONS
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TABLE 1

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F. PROCEDURE - AC LINE CONDUCTED SPURIOUS

The procedures of MP-4 were followed.

Power line conducted spurious were measured from .45 to 30 MHz using an IEEE 213 line impedance stabilization network, (LISN), modified for 50 uH network per Paragraph 5.3, of 15.840, Appendix A.

The device under test was operated in modes which maximized observed spurious.

An Advantest R3361A spectrum analyzer was used as the

detector.

Measurements were made with a 9 kHz bandwidth; quasi-peak (CISPR) detector values are shown. A 120 second scan time was used.

G. DATA - AC LINE CONDUCTED SPURIOUS

Plots of the spectrum analyzer display are shown in Figures 1a and 1b for both operating channels.

All ac-line conducted spurious were within the 48 dBu requirement of Para 15.107.

Horizontal axis is .45 to 30 MHz centered at 15.22 MHz; vertical axis is 10 db/div with the top of the screen representing 60 dBu.

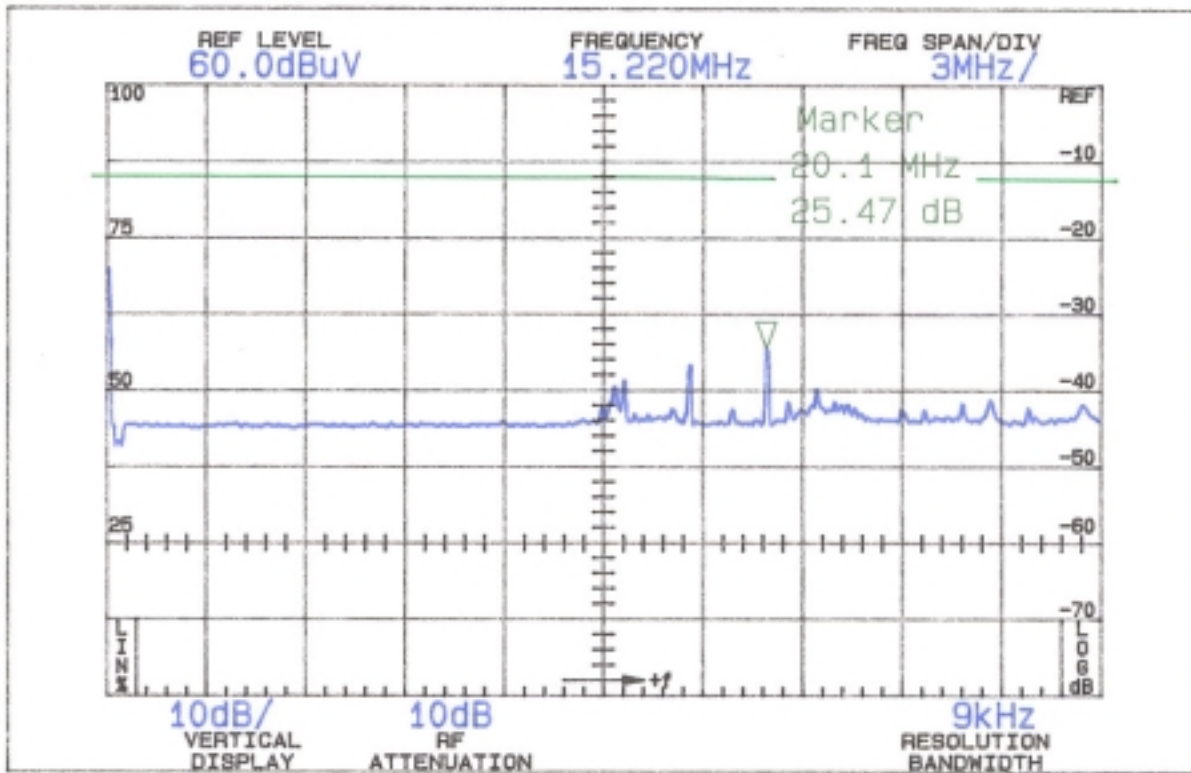
(For the 50 ohm system used, the 250 microvolt FCC limit is equivalent to 48 dBu as shown by the green line.)

H. STATEMENT

Technical test data are from tests performed by me or under my supervision. My qualifications are a matter of record with the Federal Communications Commission. I personally attest to the accuracy of the test data submitted as a part of this engineering statement.

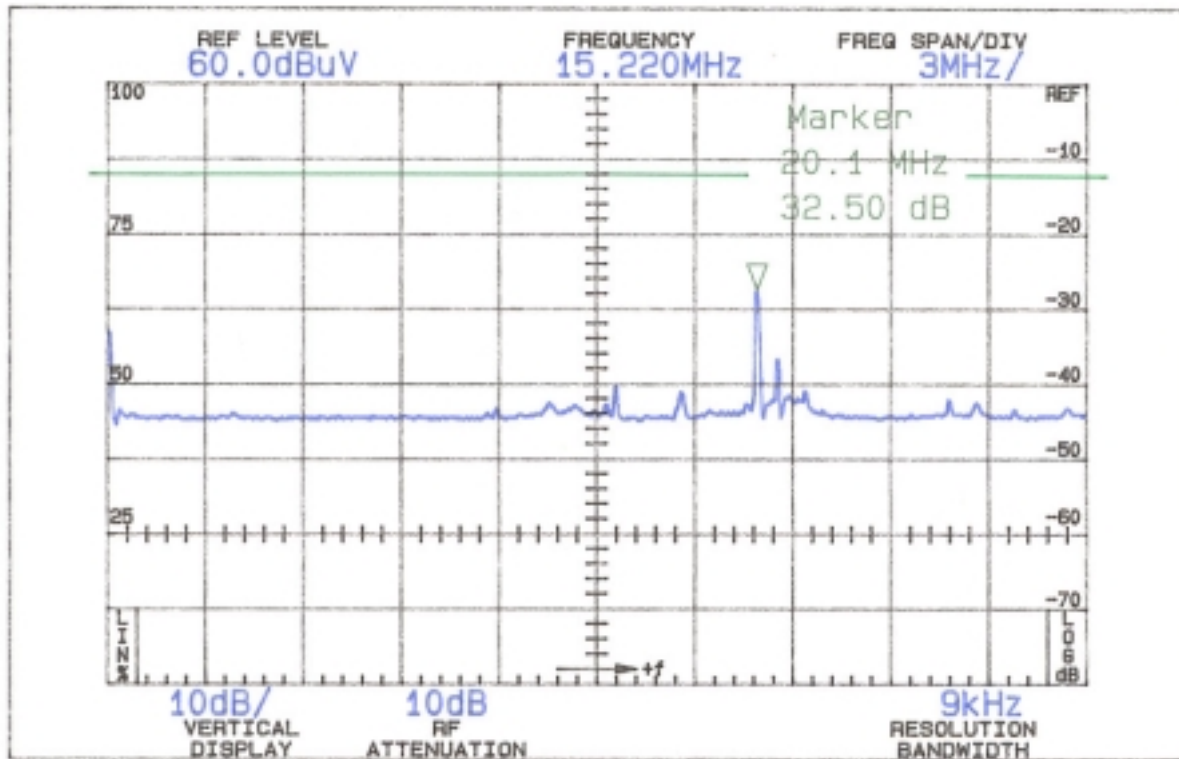
Dated: September 6, 2000

Rowland S. Johnson



AC LINE CONDUCTED SPURIOUS
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FIGURE 1a (Left LISN)



AC LINE CONDUCTED SPURIOUS
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FIGURE 1b (Right LISN)