EXHIBIT B – Technical Report

FCC ID O77-WTX-SERIES

Measurement/Technical Report

American Digital Technologies

WTX 3500

FCC ID: O77-WTX-SERIES

August 24, 2000

This report concerns (check one): Original Grant__X__ *Class II Change*____

Equipment Type: Unlicensed Security / Remote Control Transmitter

Deferred grant requested per 47 CFR 0.457 (d)(1)(ii)? Yes_____ no__X__

If yes, defer until: _____N/A_____
Date

American Digital Technologies agrees to notify the Commission by: _____N/A_____
Date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37: yes_____ no__X__

If no, assumed Part 15, Subpart C for intentional radiators – new 47 CFR [10-1-92] provision.

Report prepared by:

Northwest EMC, Inc.
22975 NW Evergreen Pkwy. Ste 400
Hillsboro, OR 97124
(503) 844-4066
Fax: (503) 844-3826

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1.0 General Information

1.1 Product Description

Manufactured By..... American Digital Technologies

Address..... PMB 278, 581 Lancaster Drive SE, Salem, Oregon USA 97301

Test Requested By: ..... Aaron Montesano

Model ..... WTX 3500

FCC ID..... O77-WTX-SERIES

Serial Number(s) ..... none

Date of Test ..... August 23, 2000

Job Number AMDI0002

Prepared By:

Vicki Albertson

Vicki Albertson, Technical Report and Documentation Manager

Technical Review By:

Greg Kiemel, Director of Engineering

Approved By:

Dean Ghizzone, President

1.1 Product Description - continued

The EUT, Model WTX 3500 is a 303.825 MHz transmitter seeking authorization under 47 CFR 15.231. It utilizes a manual switch to remotely activate garage doors and security gates. The activation switch is momentary, so the transmitter deactivates automatically within 5 seconds of release. It can only be manually activated, so it cannot be automatically activated at predetermined intervals. Upon manual activation, the EUT transmits a control signal using OOK modulation.

Typical of other similar devices such as garage door openers etc., the EUT is housed in a small plastic enclosure with a metal visor clip. It utilizes only one loop antenna that is permanently attached inside the enclosure. The data contained in this report is for that configuration.

The EUT is battery operated with no provisions for connection to the AC power line. There is no battery recharging circuitry or provisions made for recharging the batteries. Therefore, per 15.207(d), no conducted measurements were required.

The EUT contains the RF transmitter and activiation switch only, there is no digital electronics or provisions for interfacing with any other devices. Therefore, it is not subject to any other FCC authorizations such as verification or DoC.

The receiver that is to be used with this transmitter is currently in the final design stages and will be tested for compliance and authorized under a DoC.

1.2 Related Submittals/Grants

None

1.3 Tested System Details

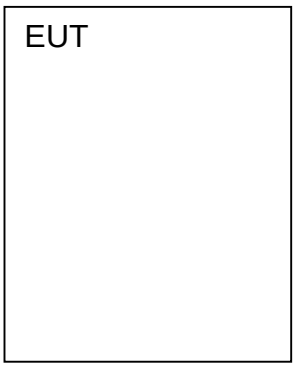
EUT and Peripherals

Item	FCC ID	Description and Serial No.
EUT	O77-WTX-SERIES	Model WTX 3500, Serial No. none

Cables

Cable Type	Shield	Length (meters)	Ferrite	Connection Point 1	Connection Point 2
none					

Figure 1: Configuration of Tested System



1.4 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4 (1992).. Radiated testing was performed at an antenna to EUT distance of 3 meters, from 30 MHz to 3.5 GHz.

1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data is located at

Northwest EMC, Inc.
22975 NW Evergreen Pkwy., Ste 400
Hillsboro, OR 97124
(503) 844-4066
Fax: 844-3826

The semi-anechoic chamber, and conducted measurement facility is located in Hillsboro, OR, at the address shown above. This site has been fully described in a report filed with the FCC (Federal Communications Commission), and accepted by the FCC in a letter maintained in our files.

Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. NVLAP Lab Code: 200059-0.

2.0 System Test Configuration

2.1 Justification

2.1.1 Operating Modes

The EUT operates on a signal channel utilizing OOK modulation. The output power and transmit frequency are not adjustable, so all testing was performed with modulation enabled at a single transmit frequency.

2.1.2 Test Configuration

Immediately prior to testing, a new battery was installed. For testing purposes only, the activation switch was modified to enable continuous transmission.

2.2 EUT Exercise Software

The EUT uses no firmware or software.

2.3 Special Accessories

None

2.4 Equipment Modifications

None.

3.0 Antenna Requirement

Per 47 CFR 15.203, the EUT uses a single antenna that is designed to ensure that no other antennas other than the one supplied by American Digital Technologies will be used with the device.

The EUT uses a permanently attached loop antenna that is mounted on a printed circuit board using a soldering connection. The antenna is completely enclosed inside the plastic chassis of the EUT.

3.1 Antenna Information

Per 47 CFR 15.204 (c), a list of antennas tested with the EUT is provided. The type, manufacturer, model number, and gain with reference to an isotropic radiator are given.

Please reference exhibit "O", file name "Antenna Information.pdf" for that information.

4.0 AC Powerline Conducted Emissions

Per 47CFR 15.207(d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines.

The EUT is battery operated and does not make provisions for battery chargers or any other connection to the AC power lines. Therefore, no AC powerline conducted emissions measurements were made.

5.0 RF Exposure Compliance Requirements

The EUT meets the requirement that it be operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines (ref. 47 CFR 1.1307, 1.1310, 2.1091, and 2.1093. Also OET Bulletin 65, Supplement C).

The EUT will only be used as a hand-held device to remote activate security gates and garage doors and can therefore be considered a mobile transmitter per 47 CFR 2.1091. It will not be incorporated into any other device.

The following is an excerpt from FCC Public Notice DA000912:

> "It is important to note that the Commission's RF exposure rules apply to all facilities, operations and devices regulated by the Commission. While a given facility, operation or device might be categorically excluded from routine evaluation for RF exposure by Section 1.1307(b)(1) of our rules, it must still comply with the FCC's exposure guidelines."

The EUT is excluded from routine evaluation for RF exposure due to its use (mobile), transmit frequency, and output power (see 47 CFR 2.1091(c)). However, it must still meet the exposure guidelines shown in 47 CFR 1.1310.

MPE Estimates

Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population as f/1500 mW/cm^2 (where f = frequency in MHz). For a transmit frequency of 303.825, this equals 0.2026 mW/cm^2. The distance from the EUT's transmitting antenna where the exposure level reaches the maximum permitted level is calculated using the general equation:

$$S = (PG)/4\pi R^2$$

Where: S = power density (0.2026 mW/cm^2, maximum permitted level)
P = power input to the antenna (789E-3mW, see calculation below*)
G = linear power gain relative to an isotropic radiator (assume 0dBi = numeric gain of 1)
R = distance to the center of the radiation of the antenna

Solving for R, the 0.2026 mW/cm^2 limit is reached 0.56 cm or closer to the transmitting antenna. Therefore, no warning labels, no RF exposure warnings in the manual, or other protection measures will be used with the EUT.

* Note: The power input to the antenna can be derived using the same general equation. Per 15.231(b), the maximum permitted peak level at the transmit frequency is 94.2 dBuV/m (at a 3 meter distance). This is equal to 697.68E-9 mW/cm^2. Solving for P, the power input to the antenna is 789E-3 mW

6.0 Field Strength of Fundamental Frequency

The field strength of the fundamental (transmit) frequency shall meet the limits as defined in 47 CFR 15.231(b). If average emission measurements are employed, the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions apply. The EUT was configured for continous modulated operation at its single transmit frequency of 303.825 MHz.

The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.4:1992).

6.1 Results

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N_1L_1 + N_2L_2 + \ldots$.

Where N_1 is the number of type 1 pulses, L_1 is length of type 1 pulses, N_2 is the number of type 2 pulses, L_2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N_1L_1 + N_2L_2 + \ldots)$/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 45.4 mSec
Pulsewidth of Short Pulse = 0.54mSec
Pulsewidth of Long Pulse = 1.17mSec
Number of Short Pulses = 9
Number of Long Pulses = 4

Duty Cycle = 20 log [((9)(0.54) +(4)(1.17))/45.4] = -13.6dB

The duty cycle correction factor of -13.6dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 120kHz and a video bandwidth of 300kHz.

The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.

The final radiated data may be referenced in Exhibit "G",
file name " Radiated Emission 15.231.pdf".

The plots of the pulse train may be referenced in Exhibit "H"
File name "Pulse Train Plots.pdf"

7.0 Spurious Radiated Emissions

The field strength of the spurious emissions shall meet the limits as defined in 47 CFR 15.231(b). If average emission measurements are employed, the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of 15.205 shall be demonstrated using the measurement instrumentation specified in that section. The EUT was configured for continous modulated operation at its single transmit frequency of 303.825 MHz. The spectrum was scanned from 30 MHz to 3.5 GHz.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

7.1 Results

Since average emission measurements were employed, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N_1L_1 + N_2L_2 + \ldots$

Where N_1 is the number of type 1 pulses, L_1 is length of type 1 pulses, N_2 is the number of type 2 pulses, L_2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N_1L_1 + N_2L_2 + \ldots)$/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 45.4 mSec
Pulsewidth of Short Pulse = 0.54mSec
Pulsewidth of Long Pulse = 1.17mSec
Number of Short Pulses = 9
Number of Long Pulses = 4

Duty Cycle = 20 log [((9)(0.54) +(4)(1.17))/45.4] = -13.6dB

The duty cycle correction factor of -13.6dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 120kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 1MHz was used.

The field strength of the spurious emissions meet the limits as defined in 47 CFR 15.231(b). The spurious emissions also meet the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions. Further, spurious emissions meet the provisions of 15.205 using the measurement instrumentation specified in that section.

The final radiated data may be referenced in Exhibit "G",
file name " Radiated Emissions 15.231.pdf".

The plots of the pulse train may be referenced in Exhibit "H"
File name "Pulse Train Plots.pdf"

The final radiated data may be referenced in Exhibit "F",
file name " Radiated Emissions 15.209.pdf".

8.0 Occupied Bandwidth

The occupied bandwidth was measured with the EUT configured for continuous modulated operation at its single transmit frequency of 303.825 MHz.

Frequency Hopping

Per 47 CFR 15.231(c), the 20 dB bandwidth of the transmit frequency is no wider than 0.25% of the center frequency. The spectrum analyzer's resolution bandwidth was ≥1% of the 20dB bandwidth and the video bandwidth was greater than or equal to the resolution bandwidth.

The occupied bandwidth data may be referenced in Exhibit "E", file name " 20dB Occupied Bandwidth.pdf"

9.0 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured level. The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

where : FS = Field Strength

RA = Measured Level

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/meter.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/meter
Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

9.1 Measurement Bandwidths

Peak Data

150 kHz - 30 MHz.....10 kHz
30 MHz - 1000 MHz.....100 kHz
1000 MHz - 10000 MHz.....1000 kHz

Quasi-peak Data

150 kHz - 30 MHz.....9 kHz
30 MHz - 1000 MHz.....120 kHz

10.0 Measurement Equipment

Instrument	Manufacturer	Model	Serial No	Cal Due
Spectrum Analyzer	Hewlett-Packard	8566B	2747A05213	1/19/2001
Quasi-Peak Adapter	Hewlett-Packard	85650A	2811A01353	1/19/2001
Spectrum Analyzer	Tektronix	2784	B010105	12/18/2000
Antenna, Horn	EMCO	3115	9710-5305	7/8/2001
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	456374	9/2/2000
Pre-Amplifier	Amplifier Research	LN1000A	25660	9/2/2000
High Pass Filter	Microlab	FH-1001	TE447910	1/28/2001