

Intertek Testing Services NA Inc.

MEASUREMENT/TECHNICAL REPORT

**Challenger, Division of Wayne Dalton Corporation -
Model: 02-5006 1, 2 and 3 Button Transmitter
FCC ID: FON02-5006
July 1998**

This report concerns (check one:) Original Grant X Class II Change _____

Equipment Type: Transmitter (example: computer, printer, modem, etc.)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No X

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
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 radiator - the new 47 CFR [10-1-97 Edition] provision.

Report prepared by:

Andrew J. Bellezza
Intertek Testing Services NA Inc.
593 Massachusetts Avenue
Boxborough, MA 01719
Phone: 978-263-2662
FAX: 978-263-7086

Intertek Testing Services NA Inc.

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

2.0 System Test Configuration

2.1 Justification

The transmitter was configured for testing in a typical fashion (as a customer would normally use it). The device was mounted to a cardboard box, which enabled the engineer to maximize emissions through its placement in the three orthogonal axis.

The device was powered from a new, fully charged 9 V battery.

For simplicity of testing, the unit was wired to transmit continuously.

The EUT was mounted on a non-conductive box to allow the engineer to manipulate the EUT in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the button is depressed, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.

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2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

Confirmed by:

Andrew J. Bellezza
Engineering Team Leader, ITE
Intertek Testing Services NA Inc.
Agent for Challenger, Division of Wayne Dalton Corporation

Andrew J. Bellezza Signature

August 3, 1998 Date

Intertek Testing Services NA Inc.

2.4 Equipment Modification

Any modifications installed previous to testing by Challenger, Division of Wayne Dalton Corporation will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services NA Inc.

Confirmed by:

*Andrew J. Bellezza
Engineering Team Leader, ITE
Intertek Testing Services NA Inc.
Agent for Challenger, Division of Wayne Dalton Corporation*

Andrew J. Bellezza Signature
August 3, 1998 Date

Intertek Testing Services NA Inc.

EXHIBIT 3

EMISSION RESULTS

3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

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3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD - AV$$

where

- FS = Field Strength in $\text{dB}\mu\text{V/m}$
- RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB
- AV = Average Factor in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Assume a receiver reading of $62.0 \text{ dB}\mu\text{V}$ is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB , and the resultant average factor was -10 dB . The net field strength for comparison to the appropriate emission limit is $32 \text{ dB}\mu\text{V/m}$. This value in $\text{dB}\mu\text{V/m}$ was converted to its corresponding level in $\mu\text{V/m}$.

$$\begin{aligned} RA &= 52.0 \text{ dB}\mu\text{V/m} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ PD &= 0 \text{ dB} \\ AV &= -10 \text{ dB} \\ FS &= 52 + 7.4 + 1.6 - 29 + 0 - 10 = 32 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

Front View

434.000 MHz

3.2 Radiated Emission Configuration Photograph (cont)

Worst Case Radiated Emission

Rear View

434.000 MHz

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3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 2 dB

*All readings are peak unless stated otherwise

TEST PERSONNEL:

Andrew T. Bellegren FOR KPS
Tester Signature

Kouma P. Sinn, Compliance Engineer
Typed/Printed Name

8/13/98
Date

Intertek Testing Services

Boxborough, MA

COMPANY: Martec Access Product
MODEL: 02-50-006

TABLE: 1
Date of Test: 06-21-1998

NOTES: Fundamental, harmonic, and spurious scan

Radiated Emissions

Frequency (MHz)	Reading (dBuV)	Distance Factor (dB)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Averaging Factor (dB)	Pulse Desensitization (dB)	Field Strength @ 3 m (dBuV/m)	Field Strength @ 3 m (uV/m)	Limits @ 3 m (uV/m)	Margin (dB)
434.000	65	0	26	0	-12	0	79	8913	11220	-2
867.830	26	0	33	0	-12	0	47	224	1122	-14
* 1301.800	56	0	26	24	-12	0	46	200	500	-8
1735.700	56	0	29	24	-12	0	49	282	1122	-12
2169.600	60	0	29	24	-12	0	53	447	1122	-8
3037.400	46	0	32	24	-12	0	42	126	1122	-19
* 33905.200	40	0	34	24	-12	0	38	79	500	-16

No other harmonic or spurious emissions were detected at a test distance of 0.3 meter.

Test Engineer: Kouma Sinn

Intertek Testing Services

Emissions Site 3 Boxborough, MA

Table:2

Company: Martec Access Product

Model: 02-50-006

Notes: Radiated scan at 1 meter (30-1000MHz)

FCC Class B Radiated Emissions

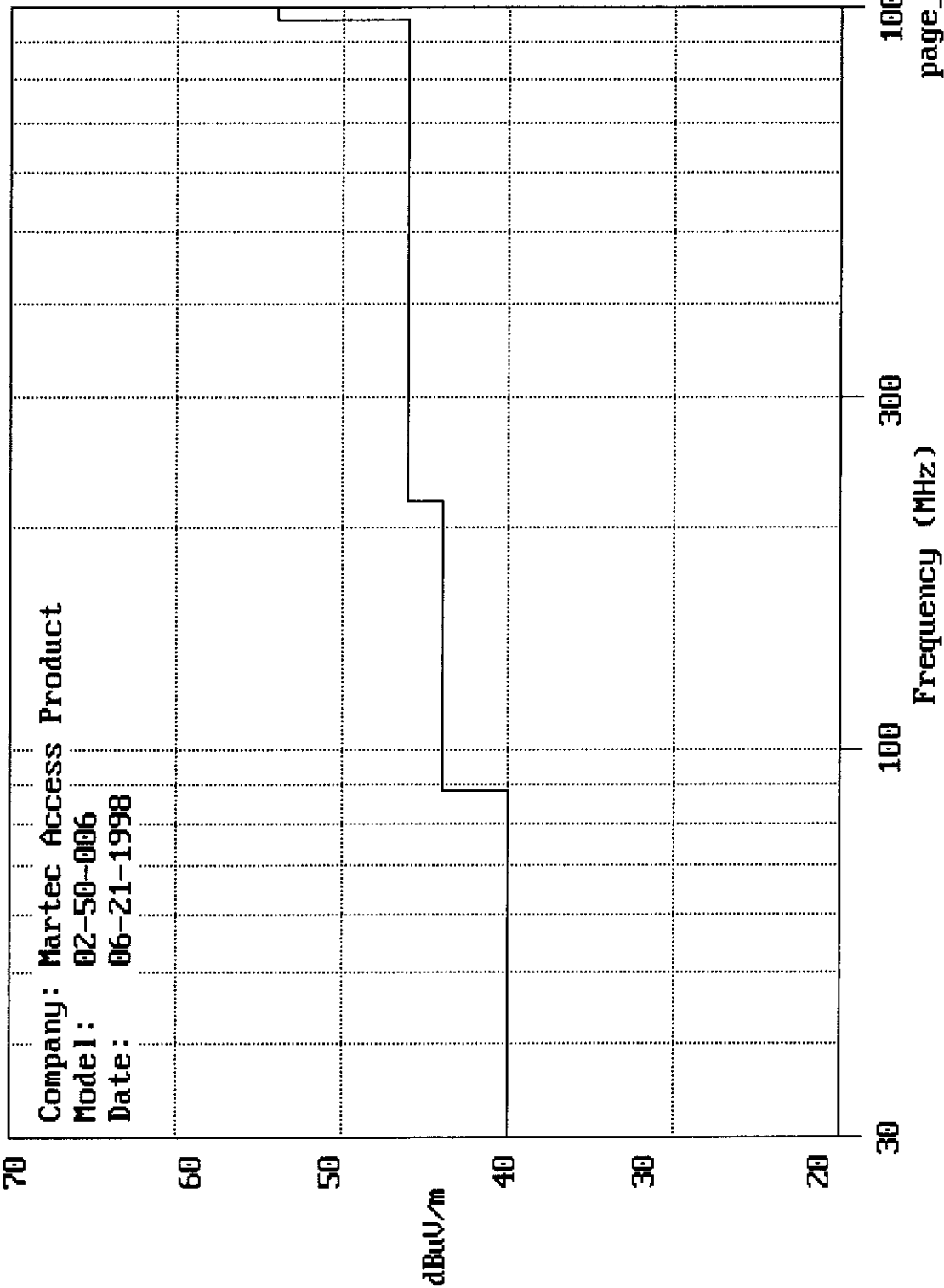
Antenna Polarity	Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB)	Net at 3 meter (dBuV/m)	Class B Limit (dBuV/m)	Margin (dB)

No Radiated emissions were detected above
the measuring equipment noise floor, which is at
least 6 dB below the applicable limit.

Test Engineer: Kouma Sinn

Test Date: 06-21-1998

3 meter FCC Class B Radiated Emissions Data from Table 2



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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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EXHIBIT 8

MISCELLANEOUS INFORMATION

8.0 **Miscellaneous Information**

This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and average factor.

8.1 Measured Bandwidth

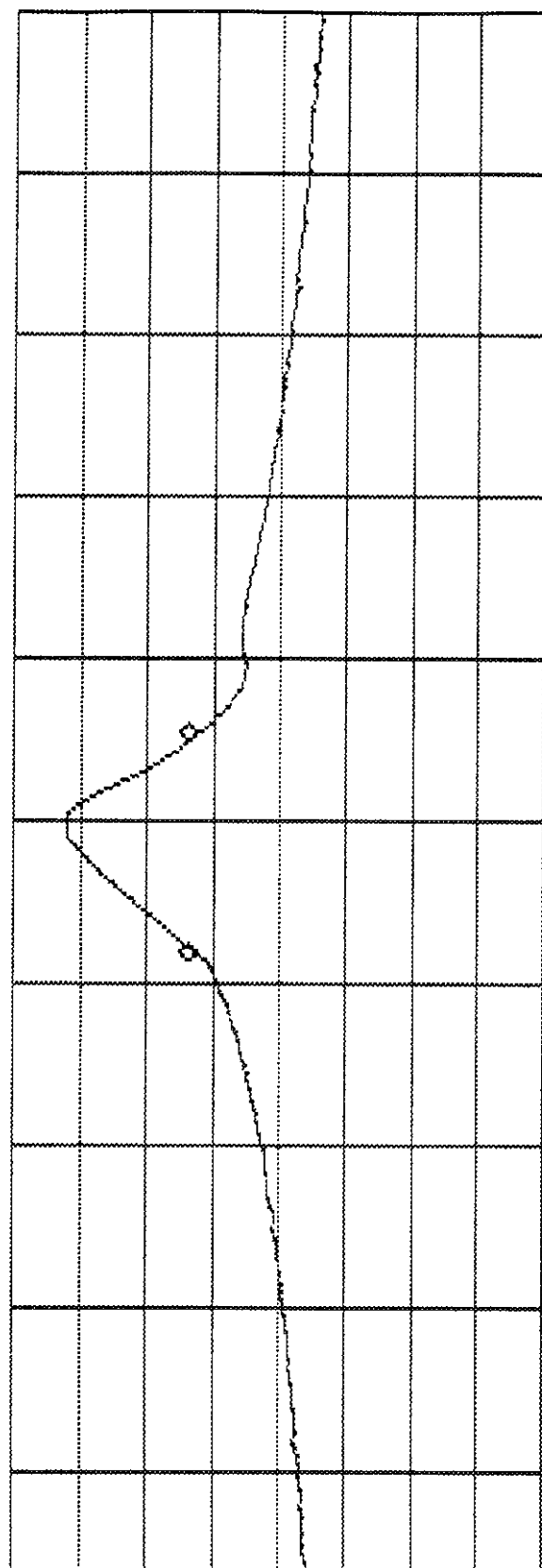
The plot on the following page shows the fundamental emission when modulated with a worst-case bit sequence. From the plot, the bandwidth is observed to be 135 kHz, at 30 dBc. The bandwidth limit is 1,085 kHz. The unit meets the FCC bandwidth requirements.

Figure 8.1 Bandwidth

13:30 JUN 21, 1998

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR Δ -135 kHz
.1B dB

60.0 dB μ V

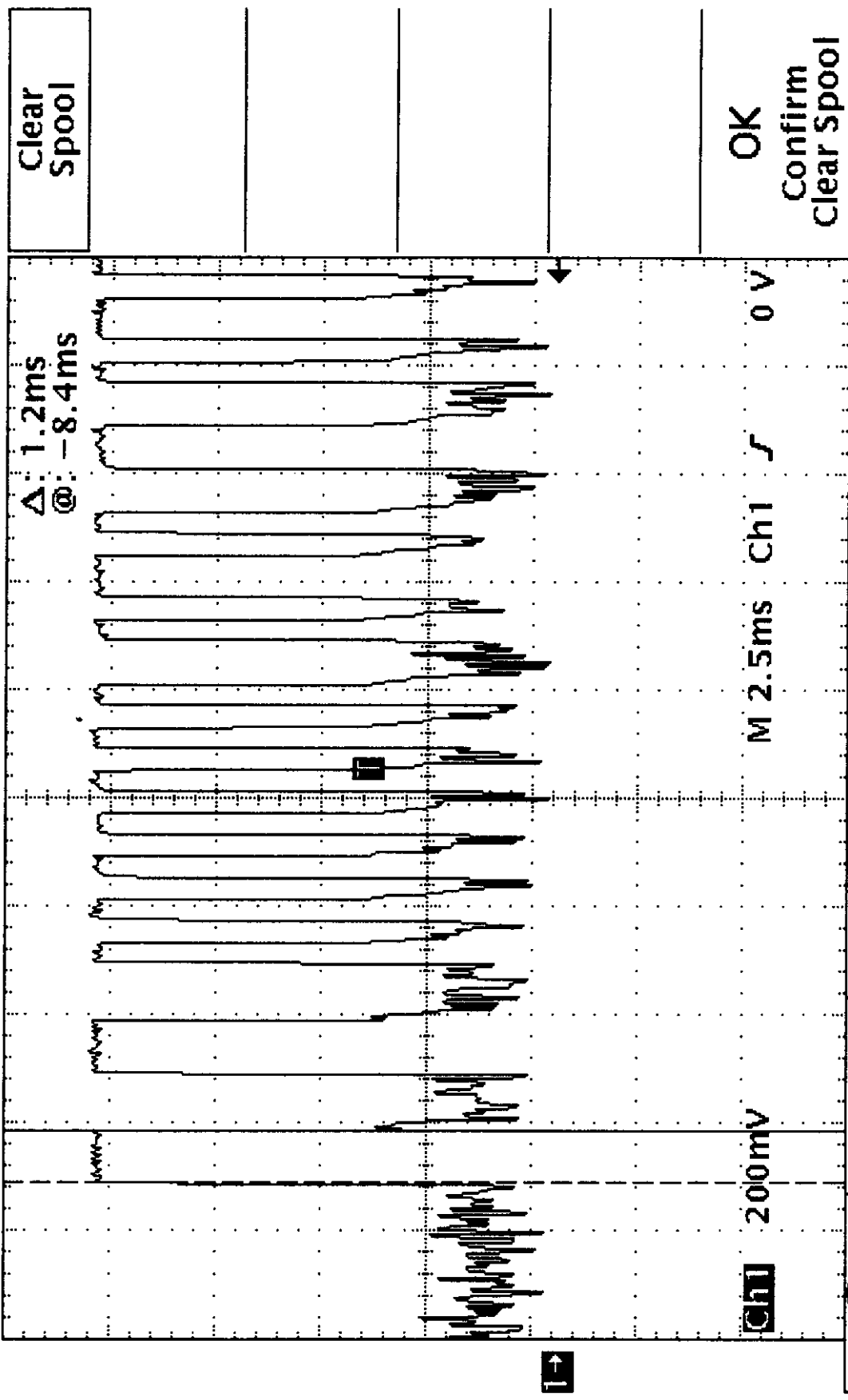


133.900 MHz
BW 30 kHz

AVG BW 30 kHz

SPAN 1.000 MHz
SWP 20.0 msec

[1 1 T]



System I/O	Hcp Port File	Hcp Layout Landscape	Hcp Format TIFF	GPIB Hard Copy	RS-232	Clear Spool
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8.2 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity was not applicable for this device. The effective period (T_{eff}) of one bit was approximately 0.975 mSec for a digital "1" bit. With a resolution bandwidth (3 dB) of 120 kHz, the pulse desensitivity factor was 0 dB.

8.3 Calculation of Average Factor

The repetition cycle of the EUT is greater than 100 ms. The averaging factor is determined as follows:

Word Cycle:	116 msec
Effective Period of Word:	56.2 msec
Duty Cycle of Word:	56.2 %

Period of Single Bit:	2.55 msec
Effective Period of a Digital "1":	1.2 msec
Duty Cycle of a Digital "1":	47 %

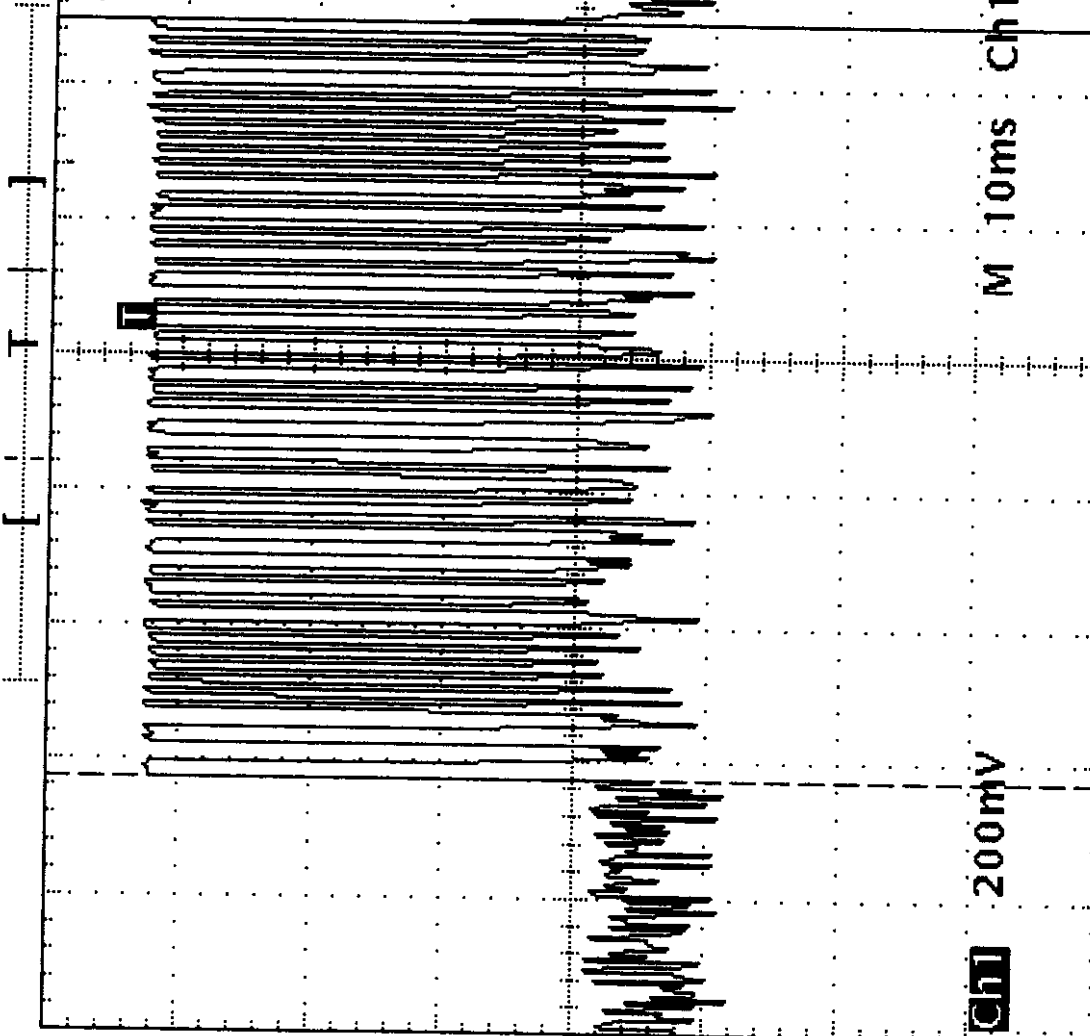
Total Duty Cycle: $(0.47058) (.562) = 26.4\%$

Average Factor = $20 \text{ Log } [(0.471)(.562)] = 12 \text{ dB}$

Plots of duty cycle are included in the following pages.

Tek Stop 5kS/s

20 Acqs



Δ: 56.2ms
@: 22ms

Clear
Spool

[Ch1] 200mV

M 10ms Ch1

f

0 V

OK

Confirm
Clear Spool

System
I/O

Hcp Port
File

Hcp Layout
Landscape

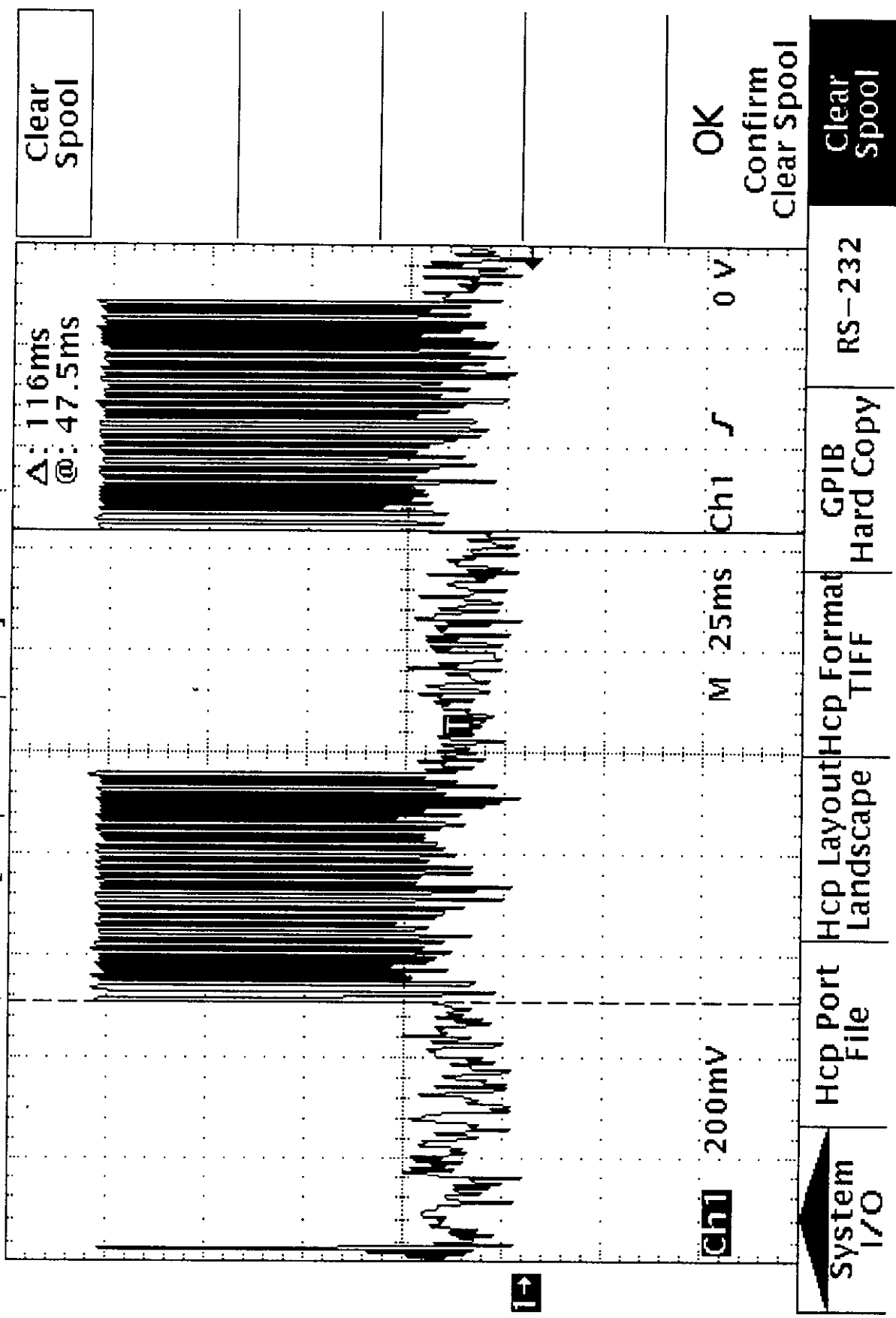
Hcp Format
TIFF

GPIB
Hard Copy

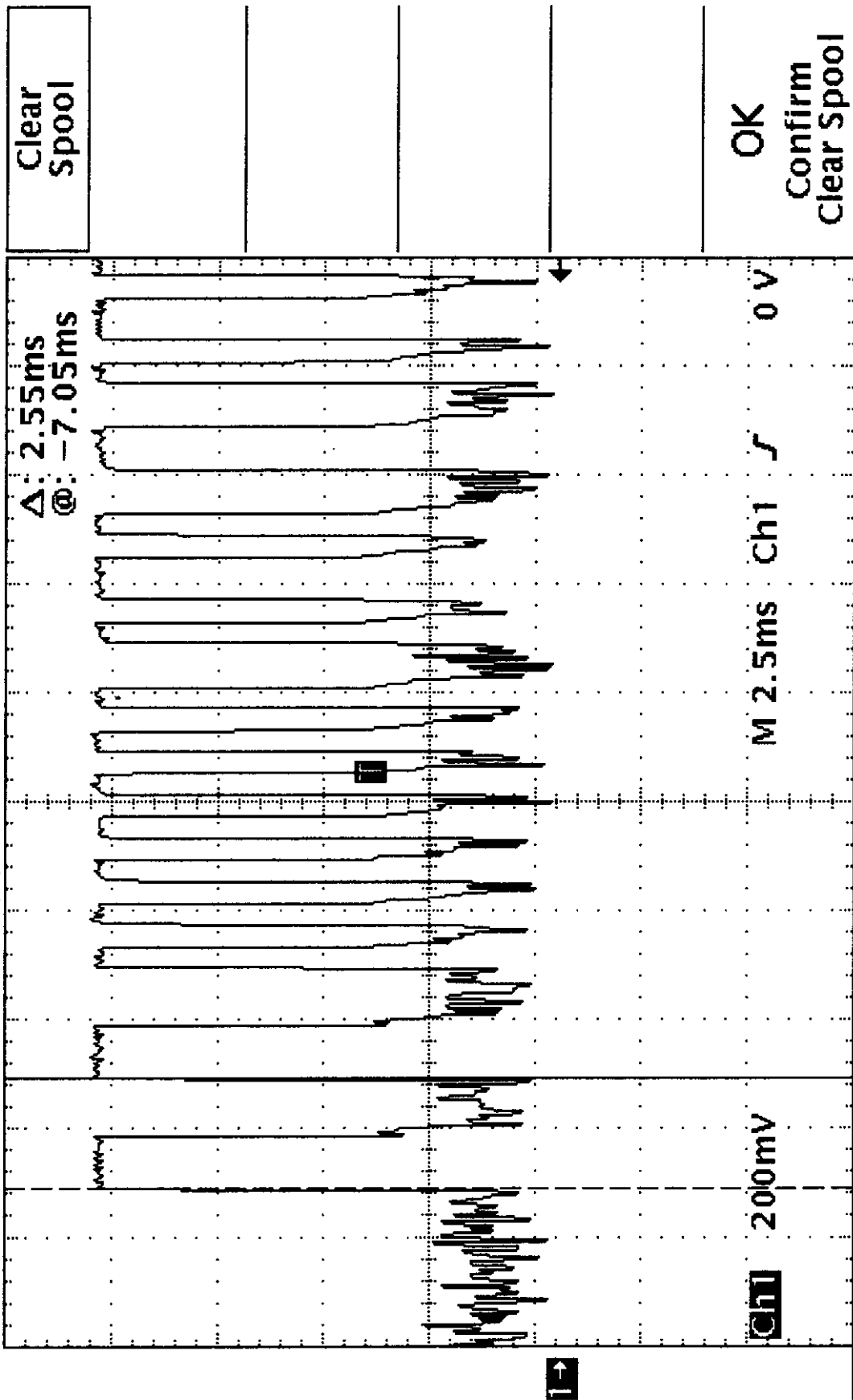
RS-232

Clear
Spool

FOR THE [] T]



[T]



System I/O	Hcp Port File	Hcp LayoutHcp Format Landscape TIFF	GPIB Hard Copy	RS-232	Clear Spool
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OK
Confirm
Clear Spool

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8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services NA Inc. in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4(1992).

The transmitting equipment under test (EUT) is attached to a cardboard box and placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the groundplane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The cardboard box is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

8.4 Emissions Test Procedures (cont)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4(1992). An IF bandwidth of 10 kHz is used, and peak detection is employed.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.