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:

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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.

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

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 Jr ________ Signature

August 3, 1998 ________ Date

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.

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 dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
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 dBμV 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 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB
FS = 52 + 7.4 + 1.6 - 29 + 0 - 10 = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/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

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. Bellezza 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
* 3905.200	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

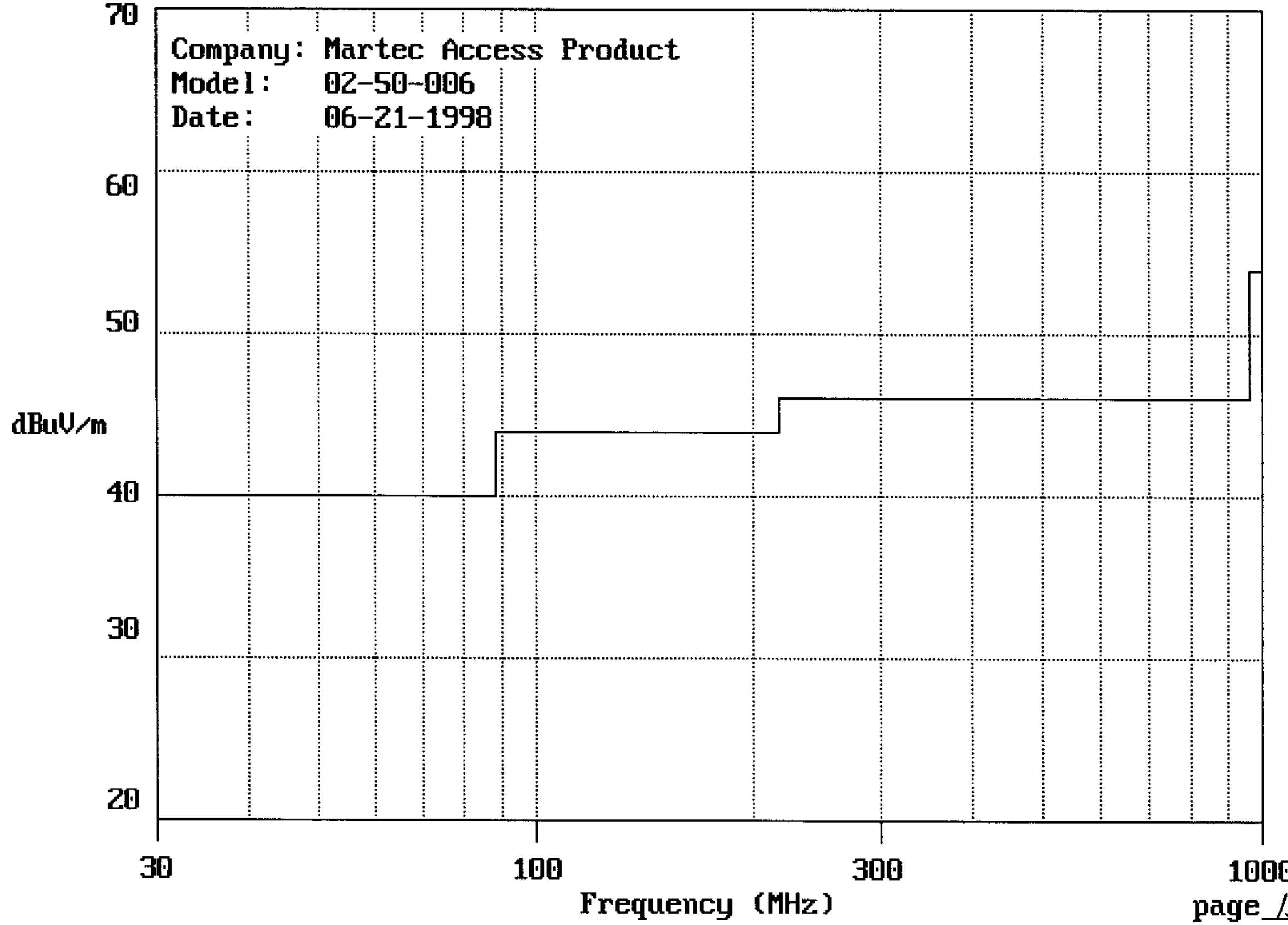


EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

EXHIBIT 8

MISCELLANEOUS INFORMATION

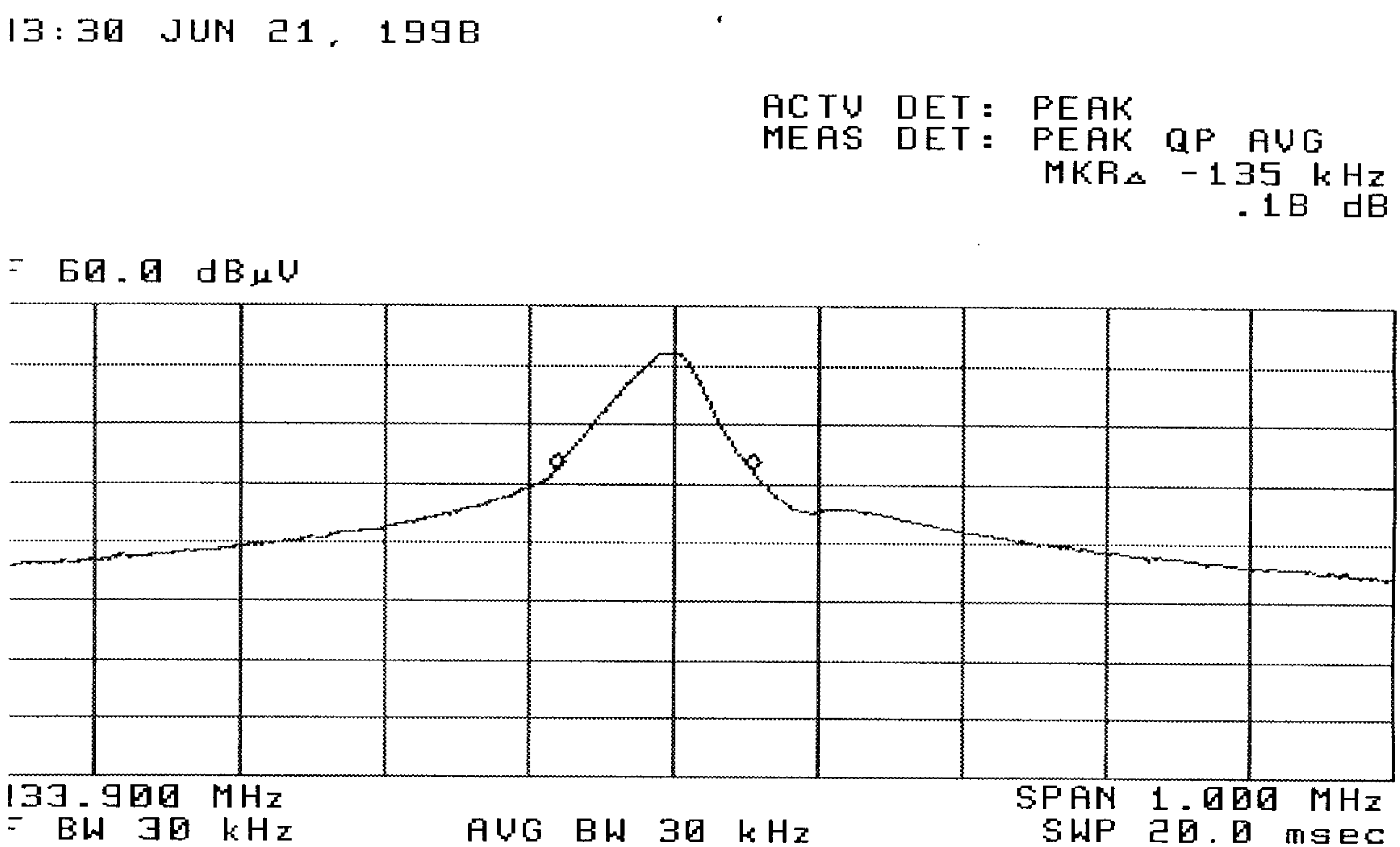
8.0 Miscellaneous Information

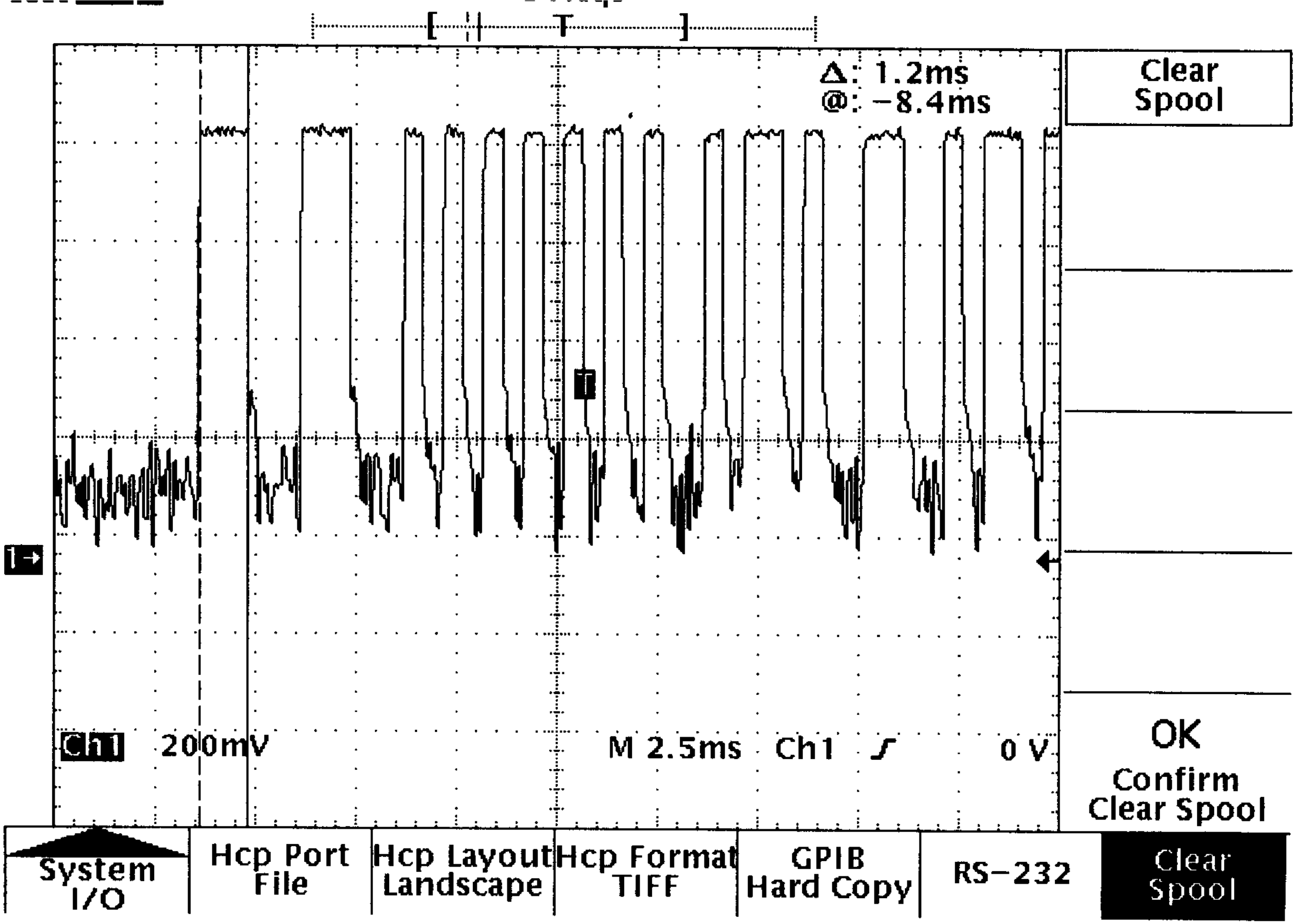
This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and average factor.

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△ -135 kHz
.18 dB
60.0 dBµV
133.900 MHz
BW 30 kHz
AVG BW 30 kHz
SPAN 1.000 MHz
SWP 20.0 msec



Δ: 1.2ms
@: −8.4ms
Clear Spool
OK
Confirm Clear Spool
Ch1 200mV
M 2.5ms Ch1 0 V
System I/O
Hcp Port File
Hcp Layout Landscape
Hcp Format TIFF
GPIB Hard Copy
RS−232
Clear Spool

13d

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.

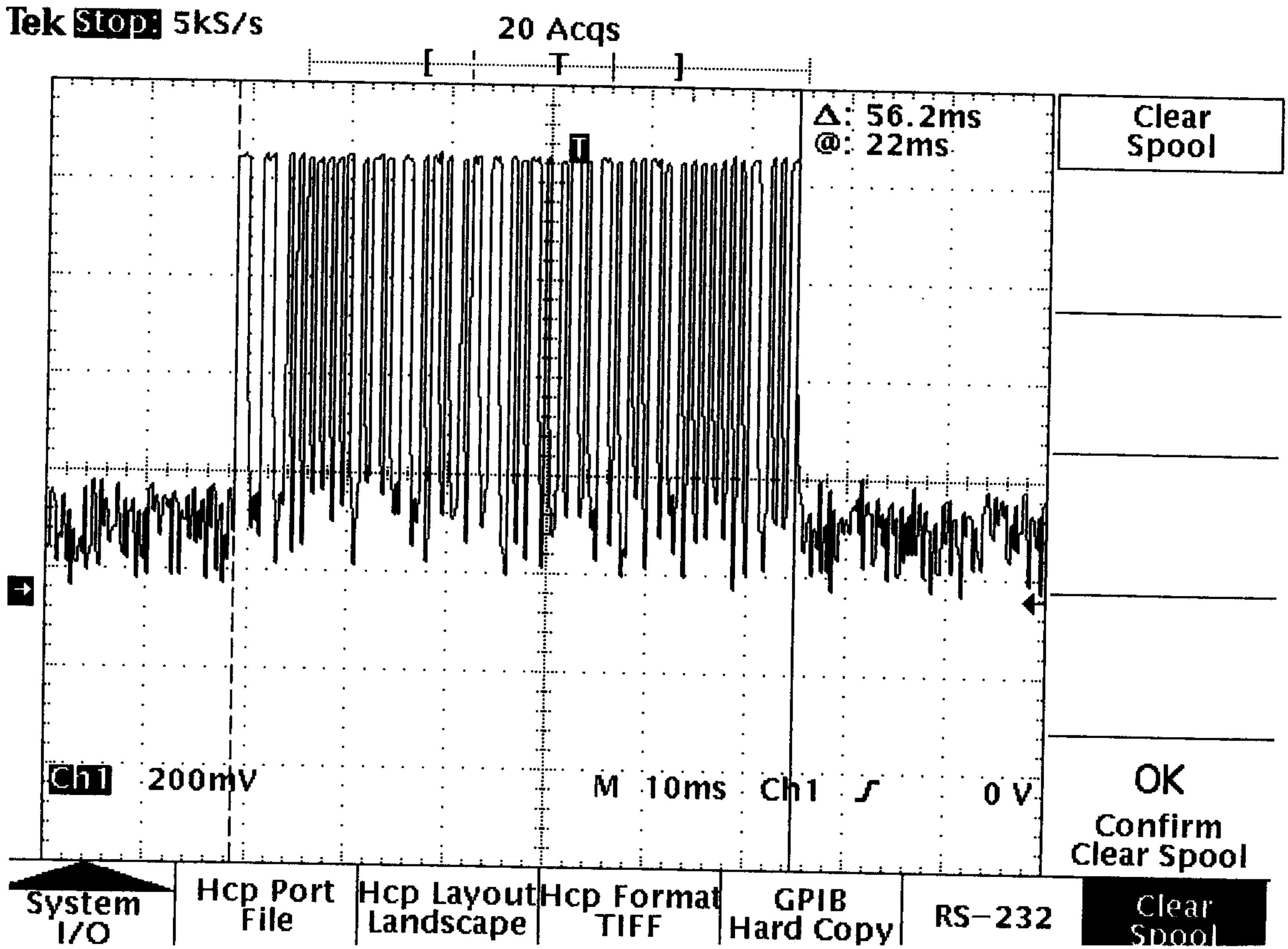
8.3 Calculation of Average Factor

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%

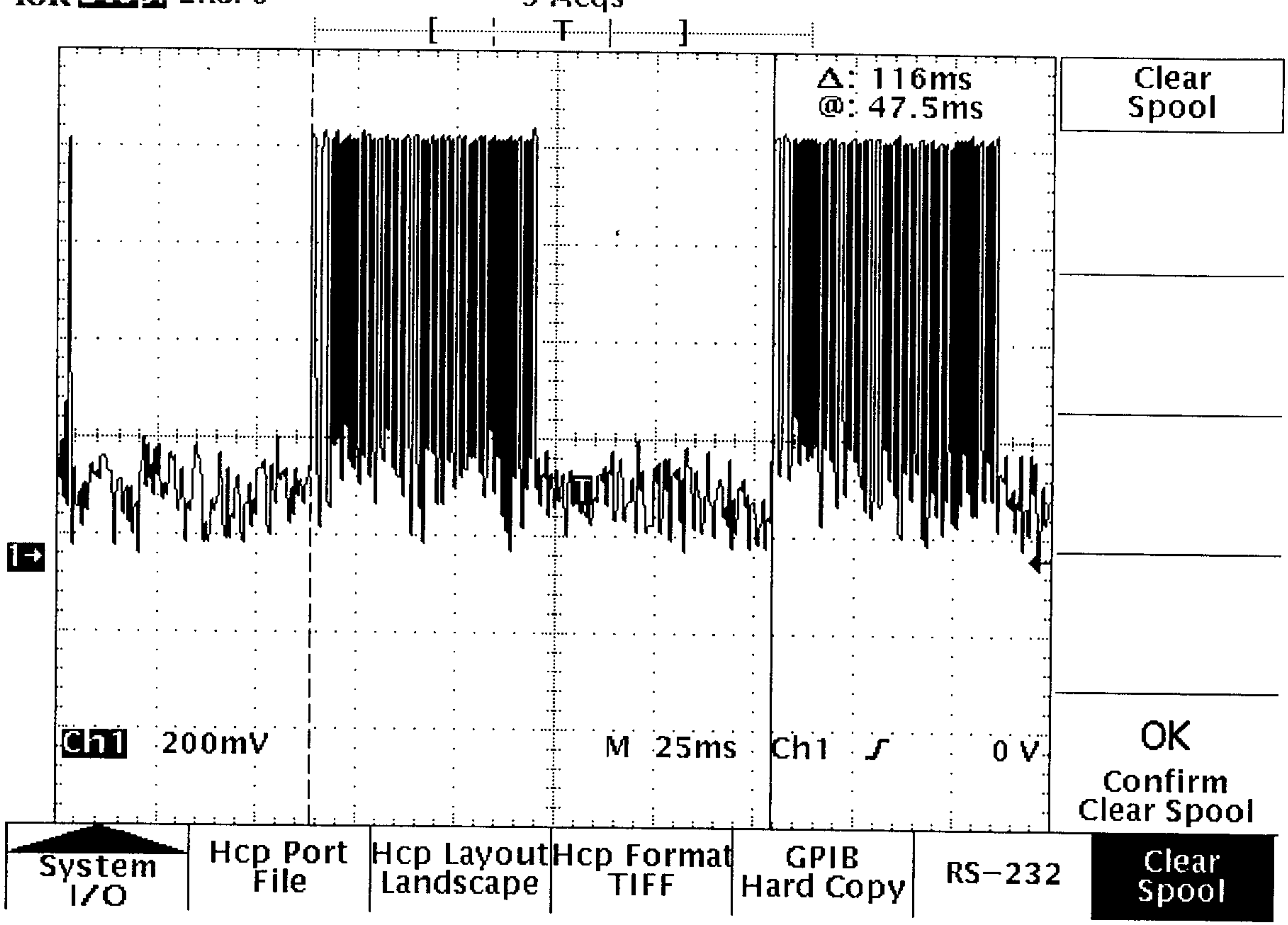
Average Factor = 20 Log [(0.471)(.562)] = 12 dB

Plots of duty cycle are included in the following pages.

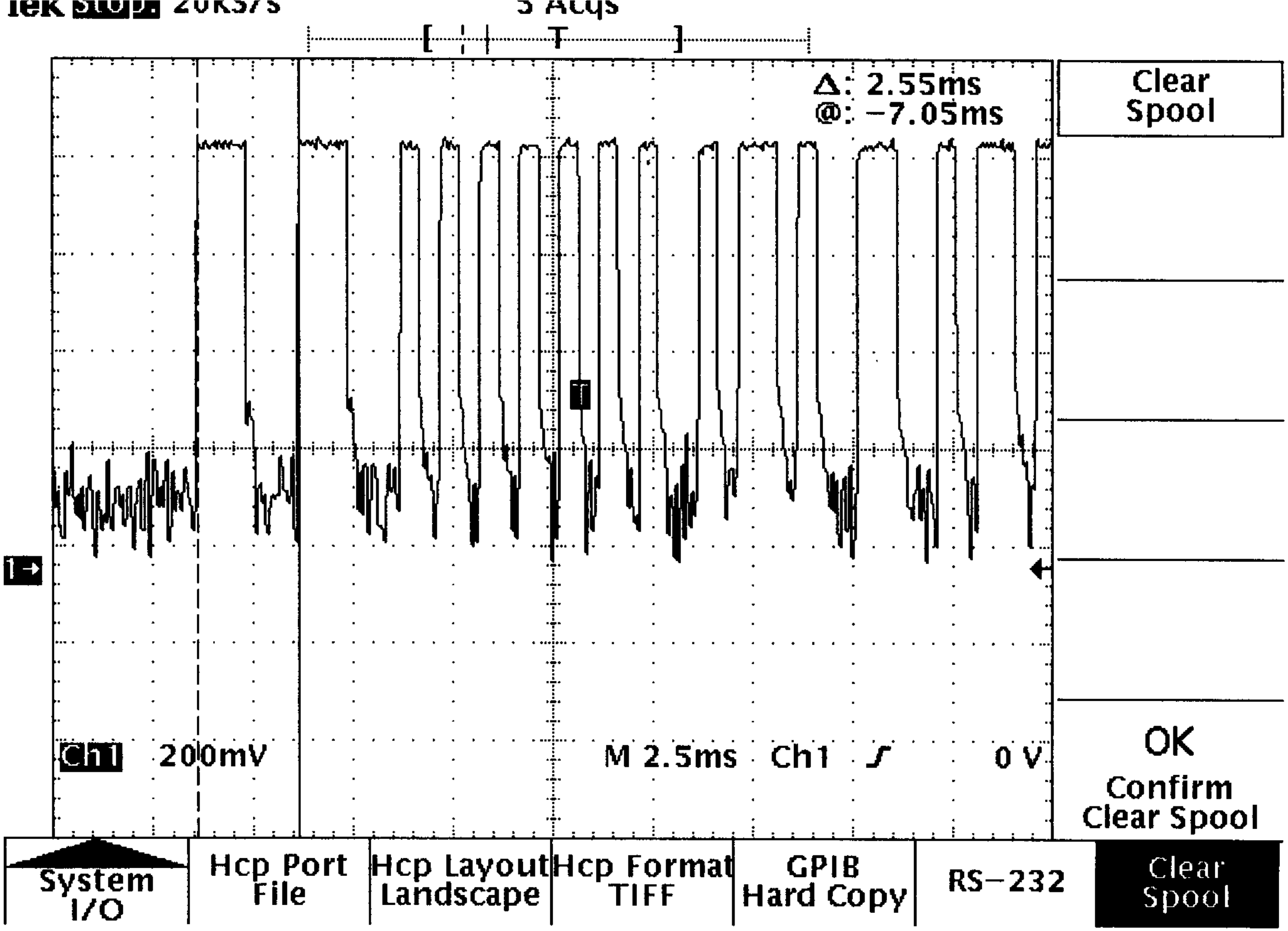


Tek Stop: 5kS/s
20 Acqs
Δ: 56.2ms
@: 22ms
Clear Spool
Ch1 200mV
M 10ms Ch1 ∫ 0 V
OK
Confirm Clear Spool
System I/O
Hcp Port File
Hcp Layout Landscape
Hcp Format TIFF
GPIB Hard Copy
RS-232
Clear Spool

13D


Δ: 116ms
@: 47.5ms
Clear Spool
Ch1 200mV
M 25ms Ch1 ʃ 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

13E


Δ: 2.55ms
@: −7.05ms
Clear Spool
Ch1 200mV
M 2.5ms Ch1
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

13F

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.