UNISYS

PCTC
Product Compliance Test Center
2476 Swedesford Road, Malvern, PA 19355

ELECTROMAGNETIC INTERFERENCE TEST REPORT

Doc. 20010914R/Project No. 714

TEST STANDARD - USA CFR 47 PART 15

STRATA FX ELECTRONIC ARTICLE SURVEILANCE DETECTION SYSTEM
FCC ID: DO4STRATAFX

CHECKPOINT SYSTEMS, INC.
THOROFARE, NJ

Test Dates: 7/30/01-8/9/01
Issue: September 21, 2001

Prepared by: _____
Paul Banker
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Approved by: _____
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PCTC/ICC

ACCREDITED
Cert. No.: 1028.01

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

PREFACE

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures and recorded data are generally described or attached in the appendices of this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

SUMMARY

The Checkpoint Systems, Inc., Strata FX as described in Section 2.1, was tested to the standards listed below, and found to have the following characteristics:

TEST	STANDARD	Frequency Range	RESULT
Radiated Emissions Intentional Radiator, Fundamental	FCC Part 15.223	1.705 to 10 MHz	Below Max. Permissible Limit
Radiated Emissions Intentional Radiator, Harmonics	FCC Part 15.209	10 MHz to 1 GHz	Below Max. Permissible Limit
Radiated Emissions Unintentional Radiator (Related to Digital Circuitry)	FCC Part 15.109	30 MHz to 1 GHz	Below Max. Permissible Limit
Conducted Emissions Unintentional & Intentional Radiators	FCC Part 15.207	450 kHz to 30 MHz	Below Max. Permissible Limit

TABLE OF CONTENTS

INDEX OF PHOTOGRAPHS

INDEX OF FIGURES

INDEX OF TABLES

1.0 Client Information

Client Name:	Checkpoint Systems, Inc. 101 Wolf Drive Thorofare, NJ 08086
Coordinators:	Gregory Sleet, David Merva
PCTC Test Personnel:	Paul Banker, Ray Rashied

1.1 Requested Service

- Measurement of radio disturbance characteristic of sample product to FCC Part 15.223 for intentional radiators.

1.2 Purpose of Test(s)

The purpose of testing was to verify compliance of the sample EUT to regulatory and/or qualification requirements adhered to by the client for product sale, distribution and use.

2.0 Description of the Equipment Under Test (EUT)

2.1 Equipment Family Description

2.1.1 General

The Strata FX System consists of three main components: the antennas, TR4025 PCB, and the power supply. The antennas are typically deployed as pairs and consist of center-fed open loops, each approximately 31.5” square. Each antenna assembly is constructed of a stainless steel retaining pan containing 16 ferrite tiles, with the antenna consisting of wire loops embedded in a plastic panel. The TR4025 PCB is designed to be remotely mounted and can drive two antennas through a length of 100-ohm transmission line. The antenna outputs of the PCB are designated “Loop 1,” and “Loop 2.”

The power supply is a linear type 24VDC 2.0 Amp design.

The overall duty cycle for transmitter operation is 7.68 %.

(2 antennae * 16 bins * 2 blasts per bin * 12 µsec/blast) = 768 µsec

768/frame rate 100 Hz (10 milliseconds) = .0768

2.2 Equipment Sample

2.2.1 Identification

A pre-production model of the Strata FX was tested:

Description:	Electronic Article Surveillance System
Model:	Strata FX with TR4025 *61 Controller and Worldwide 224 Module
Serial Number	none
Manufacturer:	Checkpoint SystemsCheckpoint Systems, Inc, Inc.
Received by PCTC:	30 July 2001
Sample type	Pre-production

Photo 1 – Strata FX

2.2.2 Condition of Received Sample

An evaluation of the Checkpoint, Strata FX was conducted to verify test subject identity and condition and to ensure suitability for testing. No evidence of physical damages was noticed. The test item condition was deemed acceptable for the performance of the requested test services.

3.0 Applicable Requirements, Methods and Procedures

3.1 Applicable Requirements

The results of the measurement of the radio disturbance, fundamental and bandwidth, characteristics of the EUT described herein may be applied, and where appropriate provide a presumption of compliance to one or more of the following regulatory requirements or to other requirement at the discretion of the client, regulatory agencies, or other entities.

3.1.1 USA

47 CFR, Part 15

Subpart B, Unintentional Radiators

Subpart C, Intentional Radiators
(Including Clause 15.223: Operation in the band 1.705MHz to 10 MHz.)

3.2 Basic Test Methods and Procedures

The applicable regulatory product family or generic standards require that radio disturbance/ interference tests be performed in accordance with the following:

- ANSI C63.4, 1992 " Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz".

Detailed descriptions of the test procedures are provided in Appendix 2 of this report.

4.0 Deviations or Exclusions from the Requirements and Standards

Per customer instructions and agreement with FCC, for measurement of the fundamental and harmonic emissions in the band 1.705 MHz to 10 MHz, a 20 dB reduction from the true peak is to be compared to the limits of 100 μV/meter (40 dBμV/meter) at 30 meters. The EUT is to be modulated as normally installed. True peak is the point at which the analyzer bandwidth is adjusted for minimum pulse desensitization. A copy of the correspondence between Checkpoint and FCC is attached in Appendix 4 for reference.

Measurement of the fundamental -- 7.6 to 9.8 MHz -- was performed by setting a spectrum analyzer to "max-hold", peak detector, a 300 kHz bandwidth, and a span from 6.5 to 10.5 MHz. A resolution bandwidth of 300 kHz was used because increasing the bandwidth above 300 kHz did not increase the detected peak of the fundamental.

5.0 Operation of the EUT During Testing

5.1 Test Environment

5.1.1 Climatic Environment

The following were the ambient conditions in the laboratory during testing:

Temperature:	22^{o} C $\pm$ 1^{o} C
Relative Humidity	50% RH $\pm$ 10%

5.1.2 Electrical Power

The EUT was operated at electrical power voltages sufficient to ensure that the measured results were representative of operation of the EUT in the power environments in which it would be installed, as specified by the client. Specifically, the EUT was supplied AC power at 120 Vac/60 Hz for all testing described in this report.

5.2 Grounding

AC ground was provided to the power supply through the AC power cord.

5.3 Operating Mode

During testing, the Strata FX was continuously transmitting and monitoring for the presence of a security tag. By design, the EUT is not capable of "standby mode". A security tag was swept through the field of the Strata FX antenna every 5 seconds to initiate a verification cycle. During this cycle, the Strata FX would indicate the presence of an article tag with an audible alarm. A green LED on the logic module of the unit would light if the tag was detected and red or yellow LED would light if an error occurred.

The TR4025 is a digital swept frequency-hopping transmitter. The TR4025 hops on discrete frequencies. The frequencies that can be transmitted by the TR4025 are as follows:

7.600708 MHz	7.673950 MHz	7.747192 MHz	7.820435 MHz
7.893677 MHz	7.966919 MHz	8.040161 MHz	8.113403 MHz
8.186646 MHz	8.259888 MHz	8.333130 MHz	8.406372 MHz
8.479614 MHz	8.552856 MHz	8.626099 MHz	8.699341 MHz

The restricted frequency bands (per FCC Part 15 Clause 15.205) in the operating frequency band of the EUT are as follows:

Frequency (MHz)	8.291 - 8.294	8.362 - 8.366	8.37625 - 8.38675	8.41425 - 8.41475

The transmitter is not capable of hopping into or operating within the restricted frequency bands.

5.4 Test Configurations

All testing described in this report was performed with the EUT in the equipment configuration shown below. The drawing shows the block diagram of the tested configuration used for the EMI and immunity tests along with AC power distribution. There were no other external interfaces or support equipment attached to the Strata FX.

Ferrite suppression devices are installed at the following locations on the TR4025 Controller:

1. Fair Rite P/N 2865000202 – Add 1 multi-aperture core each to the TX1, TX2 antenna wires
2. Fair Rite P/N 2861006802 – Add 1 multi-aperture core to the DC filter wires
3. Fair Rite P/N 0443806406 – Add 1 suppression core each to the speaker cable and DC cable (4 turns of speaker wire and three turns of DC cable)

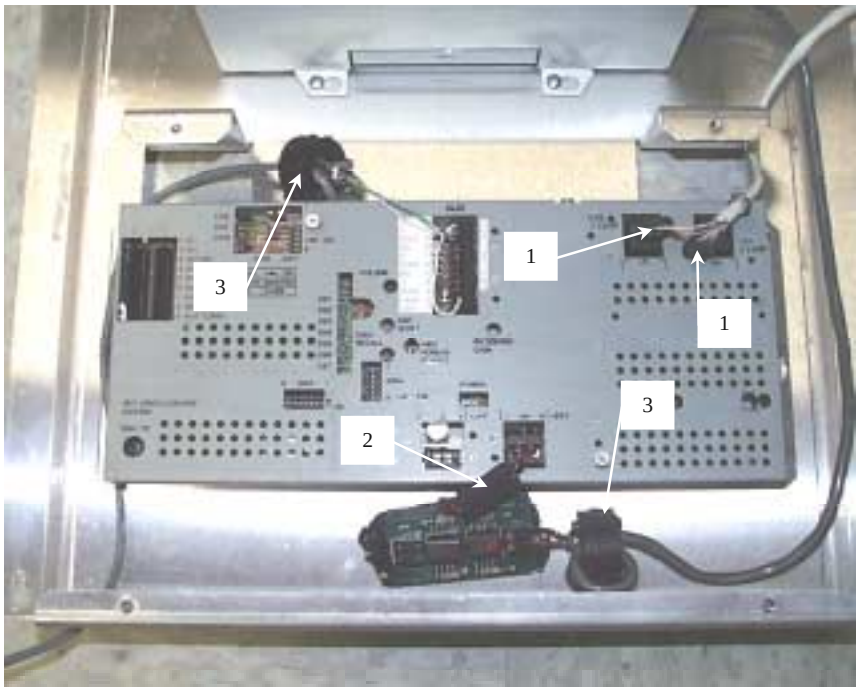

Photo 2 – Ferrite Locations

The output power of the Strata FX is factory set by two potentiometers located on the TR4025. TX1 PWR controls current to the "Loop 1" and TX2 PWR controls current to the "Loop 2." Below are the settings used for this test. The "Pot Position" indicates the pointer of the potentiometer as the hour hand on the face of a conventional clock.

EUT		**Loop 1 (TX1)**		**Loop 2 (TX2)**	
Model: Strata FX w/4025 Controller		**POT POSITION**	**CURRENT LEVEL**	**POT POSITION**	**CURRENT LEVEL**
Serial: none	Forward current	7:00	680 mA	8:00	424 mA
	Reverse current	"	680 mA	"	424 mA
Date: 7/30/2001					
Notes: Settings for measurement of fundamental at 30 Meters (FCC)					

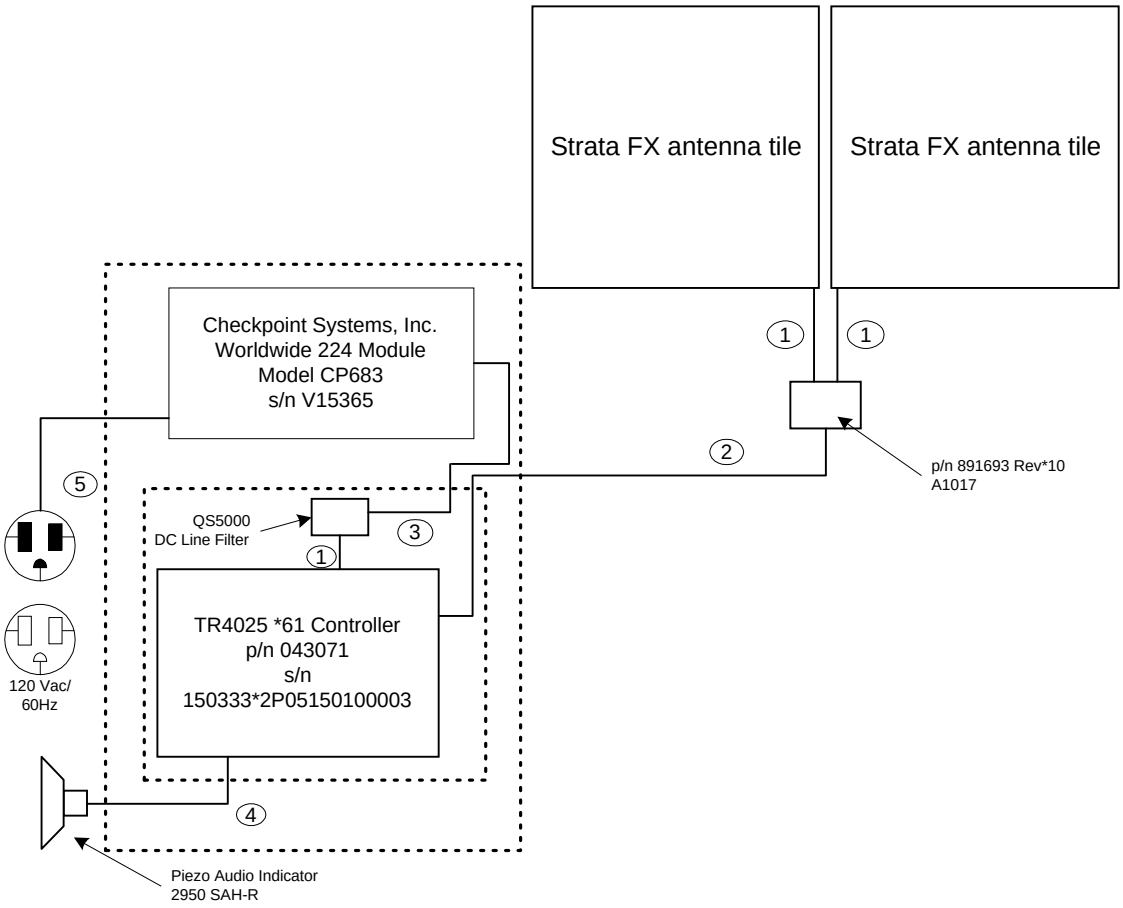

Figure 1 – Block Diagram, EMI Testing of Strata FX

Table 1 – Cable List of EUT configuration

#	Cable Description	Part Number	Manufacturer	Length
1	#18 AWG twisted pair	-	Checkpoint Systems, Inc	26”
2	4-conductor Antenna cable, shielded	-	Checkpoint Systems, Inc	44’
3	DC Power cable	-	Checkpoint Systems, Inc	2’
4	Speaker cable	-	Checkpoint Systems, Inc	10’ 7”
5	AC Line Cord, shielded	IMX 04	Eupen	2 Meters

5.4.1 EUT Details

The following devices were installed in the test field during testing:

Description	Model #	Part #	Manufacturer	Serial #
Antenna/Control Module	Strata FX	-	Checkpoint Systems, Inc.	none
Control module	TR4025 *61	043071	Checkpoint Systems, Inc.	150333*2P0515 0100003
Power Supply	Worldwide 224 Module	CP683	Checkpoint Systems, Inc.	V15365

5.4.2 Support Equipment

No equipment was used to support the operation of the Strata FX during testing.

5.5 EUT Modifications

There were no modifications added during testing.

6.0 Summary of Test Results

6.1 Emission Tests

6.1.1 Radiated Emission Test (30 July 2001)

Tables 2, 3 and 4 below show the detected field strengths as measured from the EUT(s) over the frequency range from 7.6 MHz to 30 MHz, at a distance of 30 meters compared to the maximum permissible FCC limit at 30 meters. All measurements were made using a loop antenna, placed 1-meter above the ground plane. A description of the procedures used in the performance of this test is provided in Appendix 2.

- **MEASUREMENT OF THE FUNDAMENTAL (Per Section 15.223):**

Table 2 shows the true peak measurement of the fundamental and the comparison of the adjusted true peak to the average limit.

Table 2 – Fundamental E-Field Measurement – True Peak

Freq [MHz]	Height, Pol[1] [cm 1/2/3]	Angle [Deg]	Peak Detector Voltage [dBuV]	Corr' Factor [dB/m] (2)	Field Strength [dBuV/m]	FCC Average Limit @ 30m [dBuV/m]	Delta Limit [dB]
8.200 Fund*	100,1	002	61.0 Peak	-21.4	39.6	40	-0.4

*The true peak signal level of the fundamental was measured using a peak detector as described in section 4.0.

1) Polarity of the measuring antenna is 1 - along measuring axis, 2 - along vertical axis, 3 horizontal axis. The reported signal is the highest of the signals measured along each of the axes.

2) The correction factor shown represents an antenna factor of –1.4 dB/m and the 20-dB reduction as specified in the measurement procedure.

- **MEASUREMENT RESULT -- AVERAGE**

As indicated earlier, the transmitter operates with a duty cycle of 7.68%. This would result in the following calculations for conversion from peak to average and a subsequent comparison of the fundamental with the average limit.

Table 3 – Calculated Average vs. Average Limit

True Peak:	61.0 dBµV
Pulse Duty Cycle:	7.68%
Correction to Average: 20 * Log_{10} (Duty Cycle)	-22.3 dB
Average Level: (True Peak + Correction)	38.7 dBµV
Antenna Correction:	-1.4 dB/m
Corrected Average Field Strength: (Avg Value + C.F)	37.3 dBµV/m
Limit:	40 dBµV/m
Margin with Limit:	-2.7 dB

- **EMISSIONS OUTSIDE THE BAND 1.705 MHz to 10 MHz (Per Section 15.223):**

Table 4 shows the recorded levels of emissions of the harmonics found below 30 MHz specifically, signals outside the frequency range of 1.705 MHz to 10 MHz.

Table 4 – E-Field Emissions (< 1.705 MHz and > 10 MHz)

Freq [MHz]	Height, Pol[1] [cm 1/2/3]	Angle [Deg]	Quasi-Peak Voltage [dBuV]	Corr' Factor [dB/m]	Field Strength [dBuV/m]	FCC QP Limit @ 30m [dBuV/m]	Delta Limit [dB]
16.40	100,1	000	16	-0.67	15.3	40	-24.7
24.60	100,1	000	15	1.08	16.1	40	-23.9

1) Polarity of the measuring antenna is 1 - along measuring axis, 2 - along vertical axis, 3 horizontal axis.

- **E-FIELD EMISSIONS 30 MHz to 1000 MHz (Per Section 15.209)**

Table 5 below shows the detected field strengths as measured from the EUT(s) over the frequency range from 30 MHz to 1000 MHz, at a distance of 3 meters compared to the maximum permissible FCC limit at 3 meters. A description of the procedures used in the performance of this test is provided in Appendix 2.

Table 5 – E-Field Emissions (30 MHz to 1000 MHz)

Freq [MHz]	Height, Pol [cm H/V]	Angle [Deg]	Quasi-Peak Voltage [dBuV]	Corr' Factor [dB/m]	Field Strength [dBuV/m]	FCC QP Class B Limit @ 3m [dBuV/m]	Delta Limit [dB]	Result
519.252	101,V	273	10.0	21.6	31.6	46	-14.4	Below limit
521.731	101,V	273	10.4	21.6	32.0	46	-14.0	Below limit
631.361	105,V	269	8.9	22.8	31.7	46	-14.3	Below limit
646.747	100,V	269	6.8	23.5	30.3	46	-15.7	Below limit
655.582	114,V	267	8.1	23.8	31.9	46	-14.1	Below limit
660.775	122,V	267	9.9	23.9	33.8	46	-12.2	Below limit

- Overall Result: All measured radiated emissions from the Strata FX are below the FCC 15.223 and 15.209 limits by a margin of at least 12.2 dB.

- **DIGITAL CIRCUITRY RELATED SIGNALS 30 TO 1000 MHZ – FCC 15.109B**

Table 6 below shows the detected field strengths as measured from the EUT over the frequency range from 30 MHz to 1000 MHz, related to operation of the digital circuitry of the EUT, at a distance of 10 meters compared to the maximum permissible FCC Class A limit. A description of the procedures used in the performance of this test is provided in Appendix 2.

Table 6 – E-Field Emissions Related to Digital Circuitry

Freq [MHz]	Height, Pol [cm H/V]	Angle [Deg]	Quasi-Peak Voltage [dBuV]	Corr' Factor [dB/m]	Field Strength [dBuV/m]	FCC QP Class A Limit @ 10m [dBuV/m]	Delta Limit [dB]	Result
108.337	V,100	357	12.1	12.9	25.0	43.52	-18.5	Below limit
531.728	V,100	000	-1.6	21.8	20.2	46.44	-26.2	Below limit
577.269	V,100	000	-1.4	22.3	20.9	46.44	-25.5	Below limit
600.008	V,186	261	5.6	22.4	28.0	46.44	-18.4	Below limit
679.998	V,100	282	4.0	24.4	28.4	46.44	-18.0	Below limit
999.998	V,100	000	2.6	28.3	30.9	49.54	-18.6	Below limit

- Overall Result: All measured radiated emissions from the Strata FX are below the FCC Class A limits by a margin of at least 18.0 dB.

Photo 3 -- Strata FX Radiated Emissions Test Setup – Rear View

Photo 4 -- Strata FX Radiated Emissions Test Setup – Front View

6.1.2 Bandwidth Measurement (30 July 2001)

A plot of the operating bandwidth was taken on the operating Strata FX by placing the measuring antenna close to the EUT, setting a spectrum analyzer to 10 dB/div, RBW=VBW=300 kHz, span = 7.2 to 9.2 MHz, Peak detection, max hold. This plot is shown below.

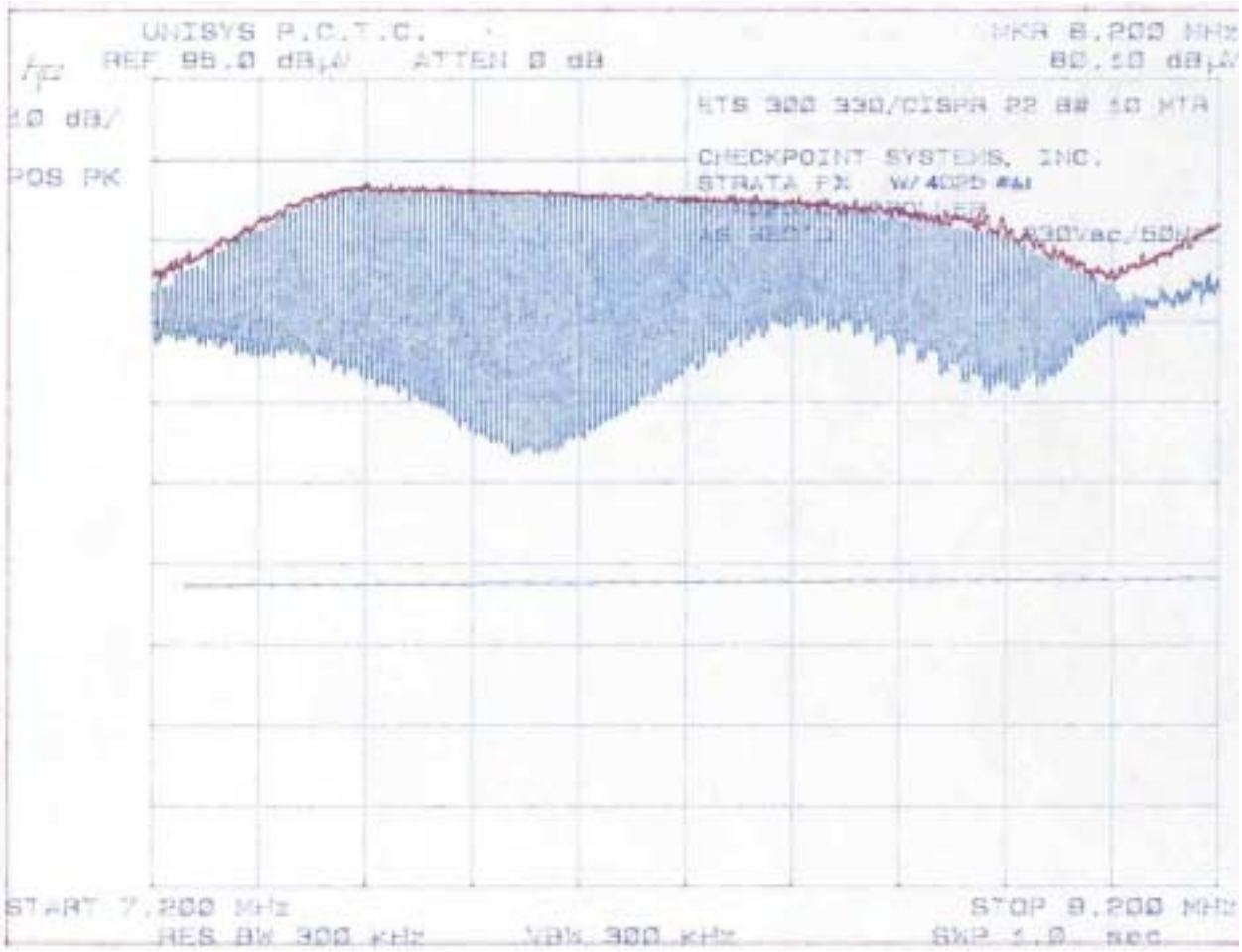

Photo 5 – Bandwidth Plot

The plot above confirms the transmitter bandwidth is 1.2 MHz as stated by the manufacturer. The bandwidth is 14.6% of the fundamental (1.2 MHz / 8.2 MHz) and therefore, per FCC Section 15.223, the limit of 100 uV/m applies for emissions between 1.705 MHz and 10 MHz.

6.1.3 Conducted Emission Test (9 August 2001)

The following tables show the conducted emissions measurement results over the frequency range 450kHz to 30MHz for the EUT for devices operating under 47 CFR part 15C, where the limit of FCC 15.207 applies. A description of the procedures used in the performance of this test is provided in Appendix 2. The Worldwide 224 Module, the power supply and 4025 Controller were positioned on an 80-cm table for the measurement of conducted emissions. This position created higher conducted emissions than positioning the power supply/controller on the ground plane.

- Worldwide 244 Module, Neutral Line 120VAC/60Hz

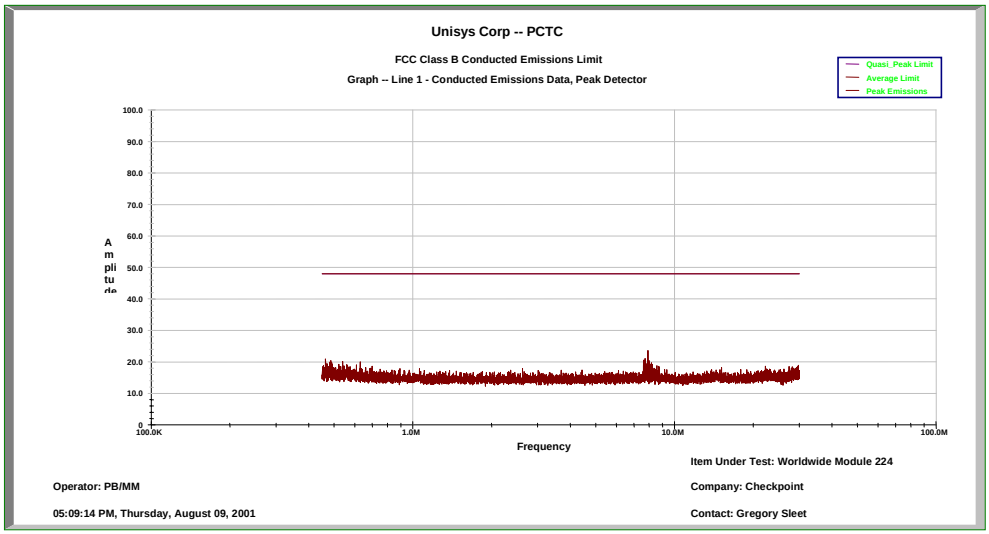

Figure 2 – Graph of AC Wireline Conducted Emissions - Neutral

Table 7 – Conducted Emissions, Neutral Line

Frequency (MHz)	Peak Amplitude (dBuV)	Correction Factor (dB)	Corrected Peak Amplitude (dBuV)	47 CFR Part 15 15.107 Class B Limit (dBuV)	Margin with Limit (dB)	Result
.463659	10.50	10.374	20.874	47.960	-27.09	Compliant
.486774	10.00	10.353	20.353	47.960	-27.61	Compliant
7.631	10.00	10.455	20.455	47.960	-27.51	Compliant
7.715	10.60	10.456	21.056	47.960	-26.90	Compliant
7.918	13.10	10.452	23.552	47.960	-24.41	Compliant
7.985	10.00	10.436	20.436	47.960	-27.52	Compliant

- Worldwide 244 Module, Phase Line 120VAC/60Hz

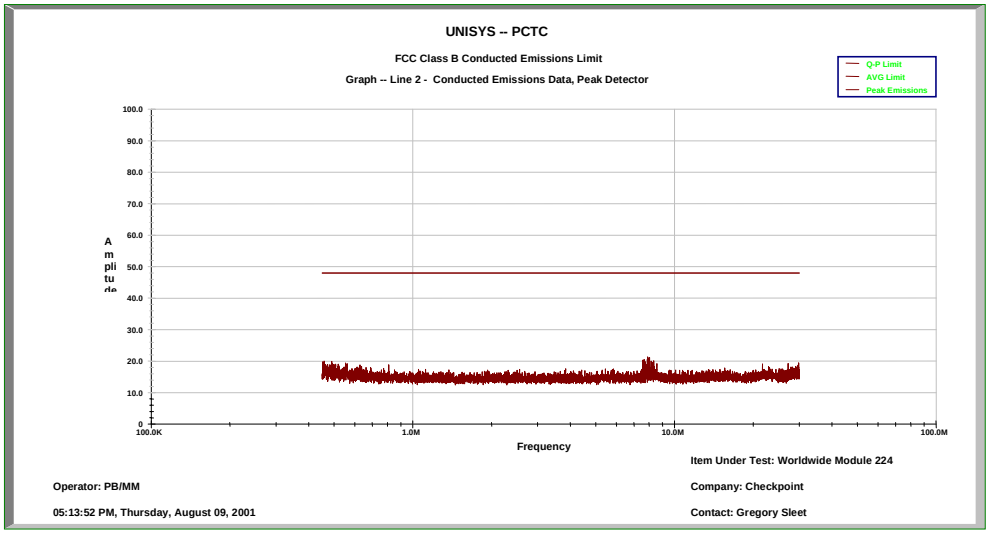

Figure 3 – Graph of AC Wireline Conducted Emissions - Phase

Table 8 – Conducted Emissions, Phase Line

Frequency (MHz)	Peak Amplitude (dBuV)	Correction Factor (dB)	Corrected Peak Amplitude (dBuV)	47 CFR Part 15 15.107 Class B Limit (dBuV)	Margin with Limit (dB)	Result
7.663	10.10	10.449	20.549	47.960	-27.41	Compliant
7.866	10.00	10.466	20.466	47.960	-27.49	Compliant
7.883	10.90	10.459	21.359	47.960	-26.60	Compliant
7.915	10.60	10.452	21.052	47.960	-26.91	Compliant
8.033	10.70	10.442	21.142	47.960	-26.82	Compliant
8.133	9.60	10.453	20.053	47.960	-27.91	Compliant

- Overall Results:

  - The Strata FX powered by the Worldwide 224 Module complied with the requirements of FCC 15.207 by a margin of at least 24.41 dB.

Photo 6 – Strata FX Conducted Emissions Test Setup

Appendix 1 – Test Equipment Listing

Radio Disturbance Test Equipment

Equipment	Model	Manufacturer	ID No.	Last Cal Date
QuasiPeak Adapter (10KHz - 1GHz)	85650A	Hewlett Packard	X717	3/30/01
Spectrum Analyzer Display	85662A	Hewlett Packard	U181	3/30/01
Spectrum Analyzer (10KHz – 1.5GHz)	8566B	Hewlett Packard	X718	3/30/01
RF Preselector (20 Hz to 2GHz)	85685A	Hewlett Packard	Y0312	3/30/01
Manual Receiver (9 kHz-30 MHz)	ESH2	Polarad	U964	11/27/00
Manual Receiver (20 MHz -1GHz)	ESV	Polarad	U965	7/16/01
LISN	MN2053	Chase Electric Limited	U776	7/16/01
Loop Antenna (300 Hz – 100 MHz)	BBH-500/B	ARA	V640	6/4/01
Antenna (25MHz to 2GHz)	LFB-2025	ARA	B-962	1/3/01

Appendix 2 – Description Of Test Facility and Procedures

A.2.0 Description of Test Methods

A.2.1 Emissions Testing

A.2.1.1 Radiated Emissions Test

Test Facilities

The test site is an all weather, open field measurement facility defined by an elliptical area of 3258 square meters, which is free of reflective metallic objects and extraneous electromagnetic signals. A non-metallic A-Frame enclosure covers 172 square meters of the ellipse. This enclosure contains a ground level 5 meter diameter turntable, capable of rotating equipment through a complete 360 degrees, and a 3 meter and 10 meter test range with remotely controlled antennae masts. The floor of the A-Frame and surface of the turntable are covered with a flat metal continuous ground plane. The ground plane extends outside the A-Frame to a distance of 35.6 meters from the center of the turntable. The width of the extension is 2.4 meters.

The ground plane is partially covered with protective insulating material. A cellar located beneath the ground level of the A-Frame structure houses personnel and instrumentation for remote control of the antennae, the turntable, and other equipment above ground level. The test site complies with the Attenuation Measurements specified in ANSI C63.4 - 1992, and is registered with FCC, and is accredited by AALA, VCCI, and NEMKO.

For electric field radiated emissions, the EUT and support peripherals or devices required to facilitate EUT operation were positioned either directly on the turntable surface or on a wooden table 80 cm. in height, depending on the size of the sample. Hardware not needed in the test field such as remote terminals or non standard exercisers, were placed in the basement below the turntable.

Procedures 9kHz to 30 MHz

Testing below 30 MHz was performed with the EUT configured on the test site as above. A loop antenna was placed at a distance of 30 meters from the EUT, one meter above the ground plane. The EUT was rotated 360° in order to obtain a maximum indication on the measuring receiver. This was repeated for each of the three polarizations of the antenna. The position of the antenna relative to the ground plane was noted in the reported data.

Procedures 1.704 MHz to 10 MHz

Testing below 30 MHz was performed with the EUT configured on the test site as above. A loop antenna was placed at a distance of 30 meters from the EUT, one meter above the ground plane. The EUT was rotated 360° in order to obtain a maximum indication on the measuring receiver. This was repeated for each of the three polarization of the antenna.

Per the agreement between Checkpoint and FCC, testing in this frequency range for fundamental emissions, a 20 dB reduction from the true peak was compared with the average limit of 100 µV/meter (40 dBµV/meter) at a measurement distance of 30 meters. The unit under test shall be modulated as normally installed.

True peak was determined by setting the spectrum analyzer with peak detector, to "max-hold" and a frequency span from 6.5 to 10.5 MHz. The resolution bandwidth was increased until no further change was noted in the peak level of the emission. Because of the duty cycle and repetition rate of the pulsed signals, a bandwidth of 300 kHz was found to be sufficient to display the true peak level of the fundamental. This insured that pulse desensitization has been minimized. The peak level was then recorded.

Procedures 30 MHz to 1000 MHz

Initial measurements, for the purpose of identifying suspect emissions from the equipment under test, were performed by dividing the test frequency range into the following twenty bands:

1)	30 - 40 MHz	8)	108 - 148 MHz	15)	570 - 670 MHz
2)	40 - 50 MHz	9)	148 - 165 MHz	16)	670 - 770 MHz
3)	50 - 88 MHz	10)	165 - 200 MHz	17)	770 - 855 MHz
4)	88 - 93 MHz	11)	200 - 300 MHz	18)	855 - 875 MHz
5)	93 - 98 MHz	12)	300 - 450 MHz	19)	875 - 892 MHz
6)	98 - 103 MHz	13)	450 - 470 MHz	20)	892 - 1000 MHz
7)	103 - 108 MHz	14)	470 - 570 MHz		

Each of these bands was monitored on a spectrum analyzer display while the turntable was initially positioned at the reference 0 degree point. A mast mounted broadband antenna was located at a distance of 10 meters from the periphery of the EUT(s). The antenna was set to 1 meter height, for the vertical polarity and 2.5 meters height, for horizontal polarity for these suspect emission scans. All emissions with amplitudes 8 dB or less below the appropriate regulatory limit were identified and saved for later source identification and investigation. This initial suspect identification procedure was repeated for turntable positions of 90, 180 and 270 degrees.

The source of questionable emissions was verified by powering off the EUT(s). Those emissions remaining were removed from the suspect list. Valid suspect emissions were then maximized through cable manipulation. The highest six signals or all within 4 dB of the limit, identified during this initial investigation, were then maximized by rotating the turntable through a complete 360 degrees of azimuth and raising the antenna from 1 to 4 meters of elevation. When the EUT(s) azimuth, antenna height and polarization that produced the maximum indication were found, the emission amplitude and frequency were remeasured to obtain maximum peak and quasi-peak field strength. The frequencies and amplitudes of RFI emissions are recorded in this report in units derived as follows:

Field Strength (dBuV/m) = meter reading (dBuV)
+ antenna factor (dB/m)
+ Cable Loss (dB)

A.2.1.2 Conducted Emissions Test

Procedure 450 kHz To 30 MHz

Peak amplitude terminal voltage emissions at the power line input to the EUT(s) were measured with a spectrum analyzer, using a peak detector and the appropriate CISPR bandwidth, connected to the RF output of a 50 Ohm, 50 microhenry Line Impedance Stabilization Network (LISN) installed in each power line. Measurements were made over the frequency range from 450 kHz to 30 MHz while the EUT(s) was operating as described in paragraph 5.3.

The significant amplitudes of emissions measured on the AC power lines of the EUT(s) are recorded in this report in units derived as follows:

Peak Emission (dBuV) = meter reading (dBuV)
+ LISN factor (dB)

Note: For speed and convenience, a spectrum analyzer employing a peak detector was used as the measuring receiver to sweep through and record the spectrum. As a tool to judge compliance of the emissions, the peak detector sweep is displayed and graphed against the appropriate average limit. This type of measurement is valid given that the peak reading will always be greater than or equal to the average or quasi-peak reading. Peak emissions recorded with the spectrum analyzer that exceed the average limit, or are found to be within 2 dB of the average limit are re-measured using the spectrum analyzer detector function first set to quasi-peak and then to average. These measurements, if necessary, are recorded and printed below each graph.

Appendix 3 – Correspondence Letter

MAR 13 '97 10:59 TO-912105223396 FROM-CHECKPOINT SYSTEMS INC T-085 P.02/02 F-071
JUL 29 '96 15:19 TO-918013443060 FROM-CHECKPOINT SYSTEMS INC T-031 P.01/02 F-074

CHECKPOINT SYSTEMS, INC.

FACSIMILE TRANSMISSION COVER

To: F.C.C. Lab

Date: 7/26/96

Attention: Mr. Ed Gibbons

Fax No: (301) 344-2050

No. of Pages: 2
(Incl. Cover)

From: Mr. Gregory E. Sleet
CHECKPOINT SYSTEMS, INC.
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Dear Mr. Gibbons:

Following up on our recent phone conversations, please confirm and if necessary correct our understanding of the points discussed below. Based on the details of our fax dated 7/3/96:

✓ • Our pulsed emissions will be treated as frequency hoping, where the bandwidth will be considered the spectrum contained between the lowest and highest carrier frequency we pulse.

✓ • A simple ratio of the maximum single restricted band infringed upon divided by the bandwidth of our fundamental emission must be less the 1% to satisfy section 15.205 of the rules.

→ • For fundamental and harmonic emissions ~~falling in the~~ in the band 1.705 - 10 mHz, a 20 dB reduction from the true peak is to be compared to the limits of 100uV/meter ~~and 30uV/meter respectively~~ at 30 meters. The unit is modulated as normally installed. True peak refers to the point at which the analyzer bandwidth is adjusted for minimum pulse desensitization.

→ • For ~~harmonics above 30 MHz~~ emissions outside the 1.705 - 10 mHz band, CISPR quasi-peak measurements will be made with the unit modulating as normally installed. Based on the bandwidth plot, care must be given to measure multiples of the worst case emission points. Limits are as specified in section 15.209.

✓ • Conducted emissions remain as specified in part 15 of the rules.

Ed Gibbons
8/2/96