CKC LABORATORIES, INC.
Testing the Future
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ACCREDITED
EMC/SAFETY

WSE TEST REPORT

FOR THE

ACCESS CONTROL READER, DR4220

FCC PART 15 SUBPART B SECTION 15.109 CLASS A AND SUBPART C SECTIONS 15.207/15.107 AND 15.209

COMPLIANCE

DATE OF ISSUE: APRIL 30, 2001

PREPARED FOR:

WSE
47102 Mission Falls Court
Fremont, CA 94539-7818

P.O. No.: 2054
W.O. No.: 76537

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: April 5, 2001

Report No.: FC01-033

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CKC Laboratories, Inc. has received Certificates of Accreditation from the following agencies:
A2LA (USA); DATech (Germany); BSMI (Taiwan); Nemko (Norway); and GOST (Russia).
CKC Laboratories, Inc has received test site Registration Acceptance from the following agencies:
FCC (USA); VCCI (Japan); and Industry Canada.
CKC Laboratories, Inc. has received Letters of Acceptance through an MRA for the following agencies:
ACA/NATA (Australia); SABS (South Africa); SWEDAC (Sweden); Radio Communications Agency (RA); HOKLAS (Hong Kong); Bakom (Swiss); BIPT (Belgium); Denmark Telestyrelsen; RvA (Netherlands); SEE (Luxembourg) SITTEL (Bolivia); and UKAS (UK).

ADMINISTRATIVE INFORMATION

DATE OF TEST:	April 5, 2001
DATE OF RECEIPT:	April 5, 2001
PURPOSE OF TEST:	To demonstrate the compliance of the Access Control Reader, DR4220 with the requirements for FCC Part 15 Subpart B Section 15.109 Class A and Subpart C Sections 15.207 and 15.209 devices.
TEST METHOD:	ANSI C63.4 (1992)
MANUFACTURER:	WSE 47102 Mission Falls Court Fremont, CA 94539-7818
REPRESENTATIVE:	Thong Nguyen
TEST LOCATION:	CKC Laboratories, Inc. 1653 Los Viboras Road Hollister, CA 95023

SUMMARY OF RESULTS

As received, the WSE Access Control Reader, DR4220 was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart B Section 15.109 Class A
- FCC Part 15 Subpart C Section 15.207/15.107
- FCC Part 15 Subpart C Section 15.209
- ANSI C63.4 (1992) method

The results in this report apply only to the items tested, as identified herein.

Test Overview

Section	Test Type	Results
15.33	Frequency Ranges	Pass
15.109	Spurious Emission Emissions Class A	Pass
15.203	Antenna Requirements	Pass
15.205	Restricted Band	Pass
15.207/15.107	Mains Conducted Emissions	Pass
15.209	Spurious Emissions	Pass

MODIFICATIONS REQUIRED FOR COMPLIANCE
None.

APPROVALS

QUALITY ASSURANCE:

Dennis Ward

Dennis Ward, Quality Manager

TEST PERSONNEL:

Art Rice

Art Rice, Test Engineer

Christine Nicklas, EMC/Lab Manager

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit.

Access Control Reader.

EQUIPMENT UNDER TEST

Access Control Reader

Manuf:	WSE
Model:	DR4220
Serial:	NA (no serial number appeared on Equipment, 002 was assigned by Lab for tracking purposes.)
FCC ID:	C4PDR4220 (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Controller (ACU)

Manuf:	Honeywell
Model:	NexSentry Controller 4100
Serial:	NA
FCC ID:	DoC

Terminal

Manuf:	Qume
Model:	QVT-31
Serial:	CAQL2449579
FCC ID:	Doc

Power Supply

Manuf:	Westinghouse Security Electronics
Model:	902-PI
Serial:	96039
FCC ID:	DoC

MODE OF OPERATION

The EUT was configured by the manufacturer to operate in a continuous transmit mode for testing purposes.

15.33 FREQUENCY RANGE TESTED

15.109 Radiated Emissions:	30-1000 MHz
15.209 Radiated Emissions:	9 kHz - 30 MHz
15.207/15.107 Conducted Emissions:	450 kHz -30 MHz

EUT OPERATING FREQUENCY

The EUT was operating at 24 VDC.

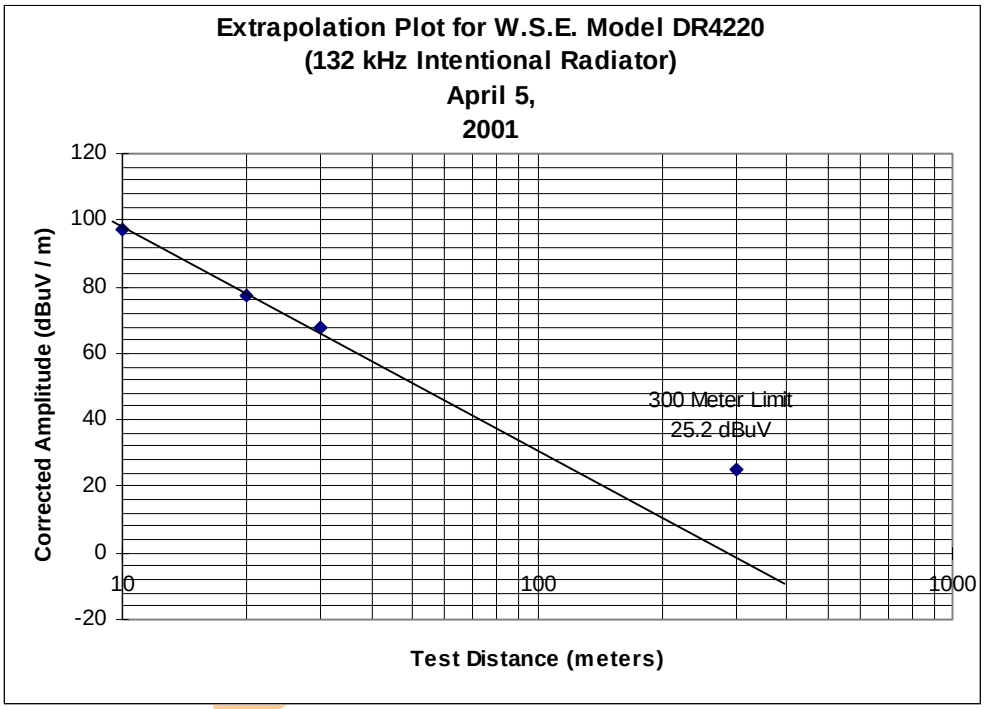
TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was 60°F.
The relative humidity was 39%.

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the Access Control Reader, DR4220. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: 15.209 Fundamental Emission Levels



10 meter reading = 96.9 dBuV/m
20 meter reading = 77.6 dBuV/m
30 meter reading = 67.9 dBuV/m

Extrapolated Reading ≅ -2 dBuV/m @ 300 meters

Table 2: 15.209 Six Highest Radiated Emission Levels - < 30MHz

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Mag L dB	dBuA/ dB	-10 d dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
0.394	41.8	10.0	-51.5	-10.0	-10.0	-19.7	55.7	-75.4	AN
0.527	39.0	10.0	-51.5	-10.0	-10.0	-22.5	33.2	-55.7	AN
0.658	42.8	10.2	-51.5	-10.0	-10.0	-18.5	31.2	-49.7	AN
0.790	39.9	10.2.	-51.5	-10.0	-10.0	-21.4	29.7	-51.1	AN
0.921	35.5	10.2	-51.5	-10.0	-10.0	-25.8	28.3	-54.1	AN
3.027	25.3	10.4	-51.5	-10.0	-10.0	-35.8	29.5	-65.3	N

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

NOTES: N = No Polarization
A = Ambient

COMMENTS: The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter spurious level below 30 MHz. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 3) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. Note 4) The EMITEST software used a -10 dB distance correction factor. I added a -10 dB additional correction factor to give a total 40 dB per decade correction factor.

Table 3: 15.209 Highest Radiated Emission Levels - 30 - 1000 MHz									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
50.716	34.7	11.5	-26.6	0.9		20.5	39.1	-18.6	VQ
57.397	38.8	9.5	-26.6	1.0		22.7	39.1	-16.4	VQ
58.085	39.8	9.3	-26.6	1.0		23.5	39.1	-15.6	VQ
62.037	37.6	8.5	-26.6	1.0		20.5	39.1	-18.6	VQ
70.861	36.9	7.2	-26.5	1.0		18.6	39.1	-20.5	VQ

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

NOTES: Q = Quasi Peak Reading
V = Vertical Polarization

COMMENTS: The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter spurious level above 30 MHz. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 3) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. Scanned 30-1000 MHz.

Table 4: 15.207/15.107 Six Highest Mains Conducted Emission Levels									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Lisn dB	dB	Cable dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
0.451672	42.2	-0.2		0.1		42.1	48.0	-5.9	W
0.458358	42.9	0.4		0.1		43.4	48.0	-4.6	B
0.485939	42.8	0.3		0.1		43.2	48.0	-4.8	B
0.504327	42.8	0.3		0.1		43.2	48.0	-4.8	B
0.511849	42.3	0.3		0.1		42.7	48.0	-5.3	B
0.548624	42.4	0.2		0.2		42.8	48.0	-5.2	B

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.207/15.107

NOTES: B = Black Lead
W = White Lead

COMMENTS: The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter fundamental level. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 4) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. The 902-PI power supply is connected to 120 V, 60 Hz.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ± 4dB measurement uncertainty.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The radiated and conducted emissions data of the Access Control Reader, DR4220, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS

	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

A typical data sheet will display the following in column format:

#	Freq	Rdng	Pream	Bicon	Log	Cable	Corr	Spec	Margin	Polar
				Mag L	LISN	-10d	dBuA/			

means reading number.
Freq is the frequency in MHz of the obtained reading.
Rdng is the reading obtained on the spectrum analyzer in dBµV.
Pream is the preamplifier factor or gain in dB.
Bicon is the biconical antenna factor in dB.
Log is the log periodic antenna factor in dB.
Mag L is the magnetic loop antenna factor in dB.
Cable is the cable loss in dB of the coaxial cable on the OATS.
Dist is the distance factor in dB used when testing at a different test distance than the one stated in the spec.
Corr is the corrected reading in dBµV/m (field strength).
Spec is the specification limit (dB) stated in the FCC regulations.
Margin is the closeness to the specified limit in dB; + is over and - is under the limit.
Polar is the polarity of the antenna with respect to earth.
LISN is the line impedance stabilization network factor in dB for conducted emissions.
-10d is an error correction factor.
dBuA/ is a dBuV/m conversion.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated and conducted emissions data for the Access Control Reader, DR4220. The magnetic loop antenna was used for measurements below 30 MHz. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

FCC SECTION 15.35:
TABLE B: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	450 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Access Control Reader, DR4220.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. The magnetic loop antenna was used for measurements below 30 MHz. The magnetic loop antenna was used for measurements below 30 MHz.The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 450 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

TRANSMITTER CHARACTERISTICS

15.203 Antenna Requirements

Antenna Type: Integral
Connection to EUT: Integral, non-removable

The antenna is an integral part of the EUT and is NON-Removable; therefore the EUT complies with Section 15.203 of the FCC rules.

15.205 Restricted Bands

Operating frequency: 24 VDC

The fundamental operating frequency lies outside the restricted bands and therefore complies with the requirements of Section 15.205 of the FCC rules.

Any spurious emission coming from the EUT was investigated to determine if any portion lies inside the restricted band. If any portion of a spurious emissions signal was found to be within a restricted band, investigation was performed to ensure compliance with Section 15.209.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	**N/A**
CRT was displaying:	**N/A**
Power Supply Manufacturer:	**WSE**
Power Supply Part Number:	**N/A**
AC Line Filter Manufacturer:	**N/A**
AC Line Filter Part Number:	**N/A**
Line voltage used during testing:	**24 Volt DC**

I/O PORTS	
Type	#
RS 485	**1**

CRYSTAL OSCILLATORS	
Type	Freq In MHz
Crystal	**11.059**

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Access Ctrl Reader	**DR4220 Rev-A**	**11.059**	**6**	**Reader**

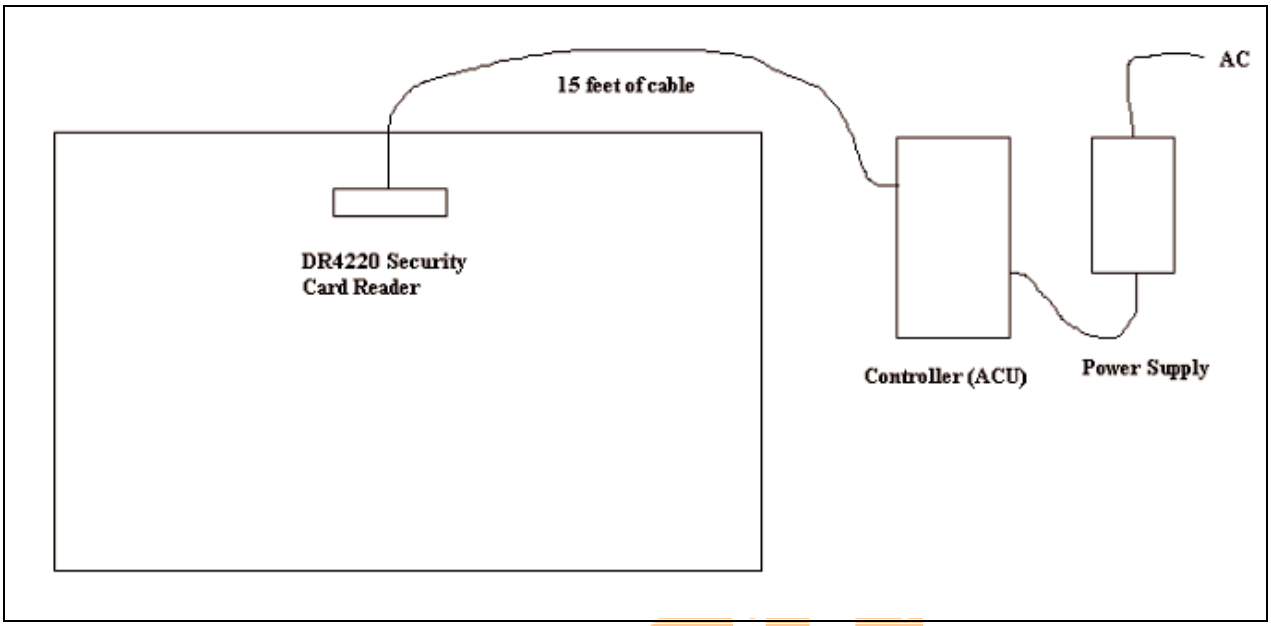
CABLE INFORMATION

Cable #:	1	Cable(s) of this type:	
Cable Type:	**Round**	Shield Type:	**Foil**
Construction:	**PCB mounting**	Length In Meters:	**10**
Connected To End (1):	**DR4220**	Connected To End (2):	**ACU**
Connector At End (1):	**Phoenix**	Connector At End (2):	**Phoenix**
Shield Grounded At (1):	**Foil**	Shield Grounded At (2):	**Foil**
Part Number:	**N/A**	Number of Conductors:	**5**
Notes and/or description:			

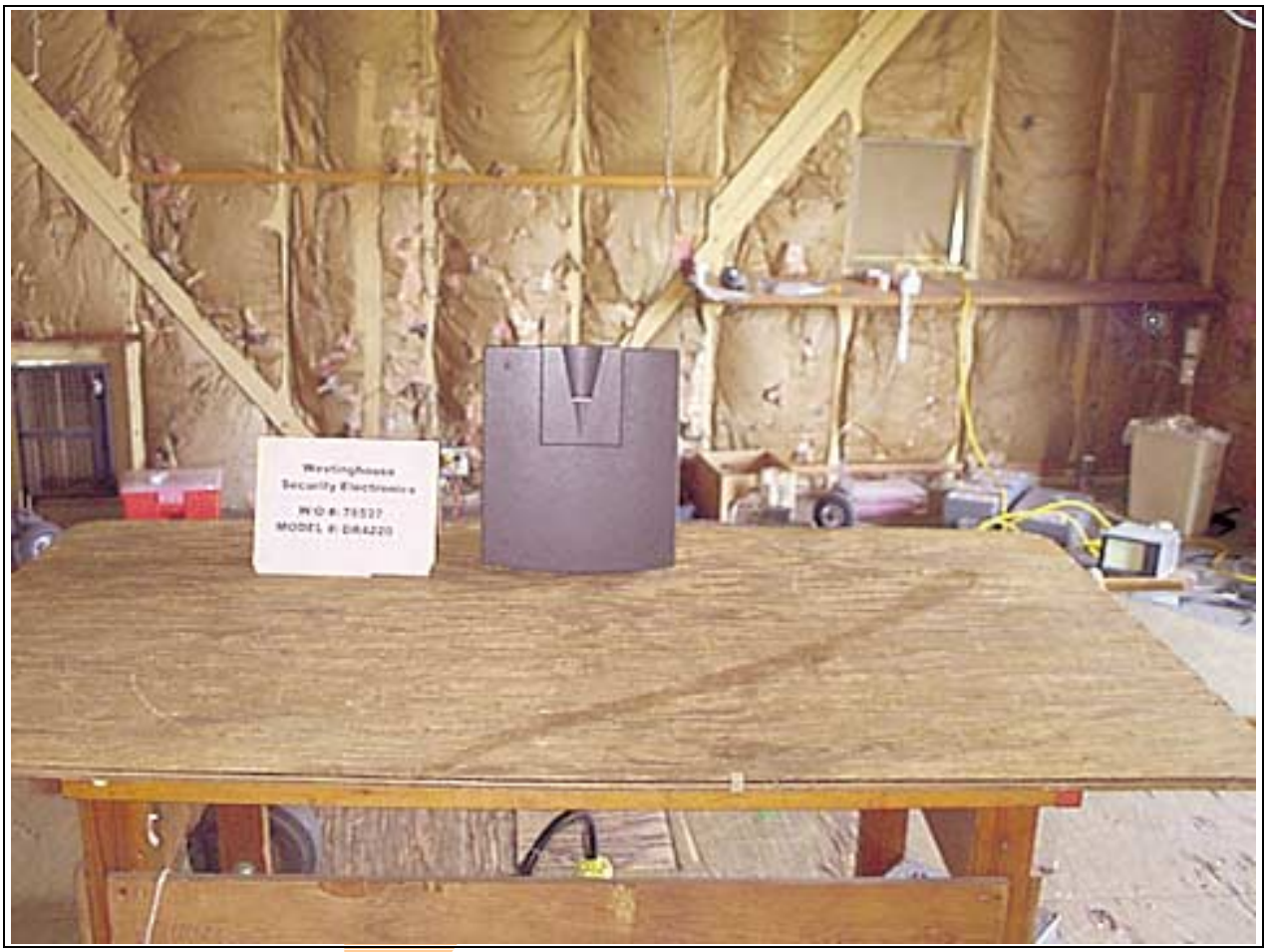
Cable #:	**2**	Cable(s) of this type:	
Cable Type:	**Round**	Shield Type:	**Foil**
Construction:	**Phoenix**	Length In Meters:	**1**
Connected To End (1):	**ACU**	Connected To End (2):	**902 PI Power Supply**
Connector At End (1):	**Phoenix**	Connector At End (2):	**Phoenix**
Shield Grounded At (1):	**Foil**	Shield Grounded At (2):	**Foil**
Part Number:	**N/A**	Number of Conductors:	**3**
Notes and/or description:			

Cable #:		Cable(s) of this type:	
Cable Type:	**Round**	Shield Type:	**No**
Construction:	**Phoenix**	Length In Meters:	**2**
Connected To End (1):	**902 PI**	Connected To End (2):	**AC Power**
Connector At End (1):	**Molded female**	Connector At End (2):	**3 prong plug**
Shield Grounded At (1):	**No**	Shield Grounded At (2):	**No**
Part Number:	**N/A**	Number of Conductors:	**3**
Notes and/or description:			

EQUIPMENT TEST SETUP DIAGRAM

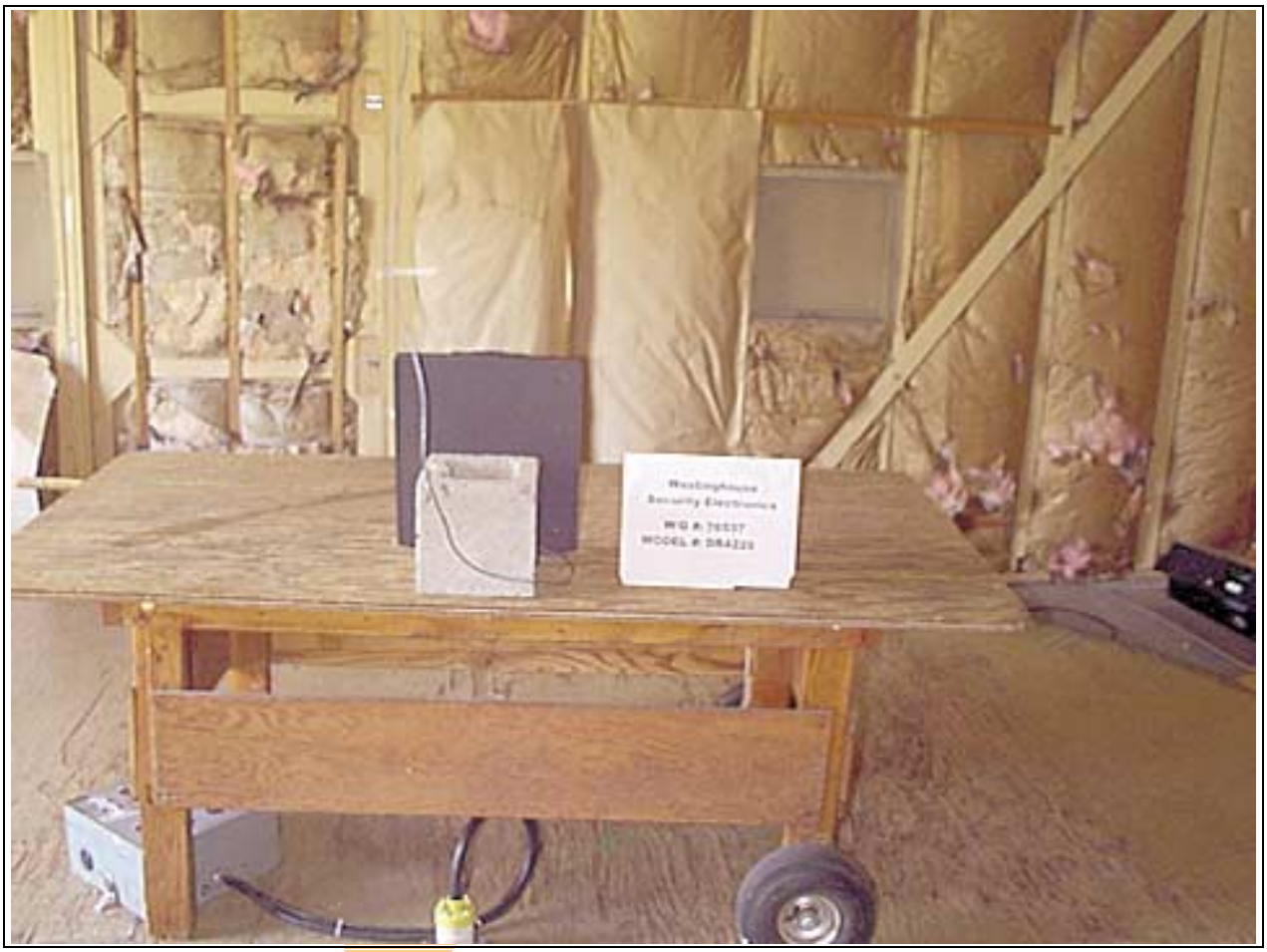


PHOTOGRAPH SHOWING RADIATED EMISSIONS



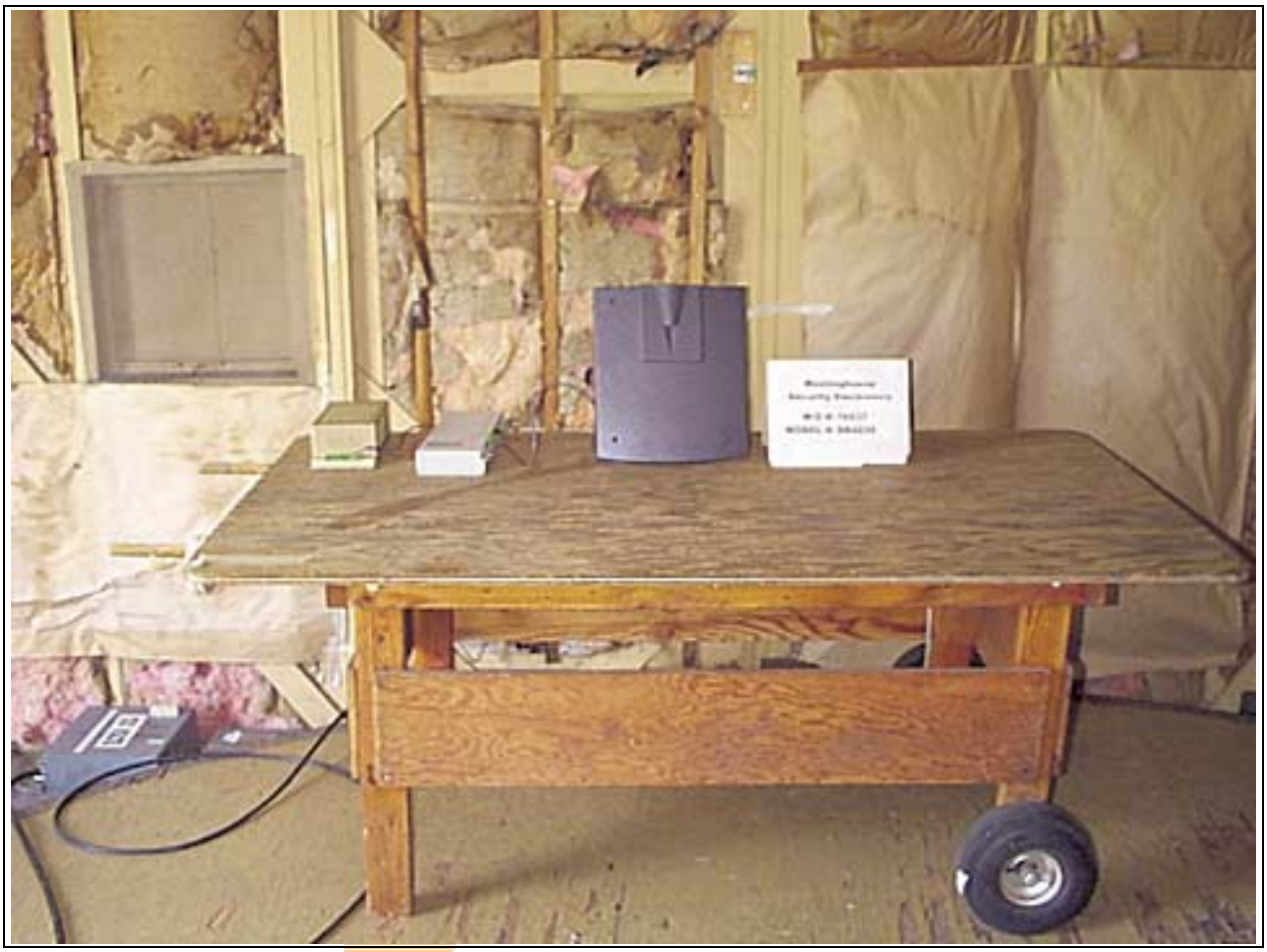
Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

PHOTOGRAPH SHOWING CONDUCTED EMISSIONS



Conducted Emissions - Front View

PHOTOGRAPH SHOWING CONDUCTED EMISSIONS

Conducted Emissions - Side View

APPENDIX B

TEST EQUIPMENT LIST

Hollister A

Industry of Canada File No. IC 3170-A

Function	S/N	Calibration Date	Cal Due Date	Asset #
Mag loop, Emco 6502	2078	08/17/2000	08/17/2001	432
HP 85650A QP Adaptor	2043A00286	09/17/2000	09/17/2001	445
HP-85670A	2541A00127	03/23/2001	03/23/2002	2053
HP-85662A	2542A10733	03/23/2001	03/23/2002	2052
HP 8447F Preamp	2944A03850	03/21/2001	03/21/2002	501
Bicon, Emco 3110	9205-1522	10/30/2000	10/30/2001	503
Log Periodic, A.H. SAS200/510	318	05/22/2000	05/22/2001	0
LISN, Solar 8028-50-TS-24-BNC	910490	09/13/2000	09/13/2001	737
LISN, Solar 8028-50-TS-24-BNC	910489	09/13/2000	09/13/2001	736
Conducted Cable	condcabl-ha00	03/01/2001	03/01/2002	0

APPENDIX C

MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485

Customer: **Westinghouse Security Electronics**
Specification: **FCC15.209 at 30m**
Work Order #: **76537** Date: 04/05/2001
Test Type: **Maximized Emissions** Time: 11:55:27
Equipment: **Security Card Reader** Sequence#: 3
Manufacturer: W.S.E. Tested By: Art Rice
Model: DR4220
S/N: none

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Security Card Reader*	W.S.E.	DR4220	none

Support Devices:

Function	Manufacturer	Model #	S/N
Controller (ACU)	Honeywell	NexSentry Controller 4100	none
Terminal	Qume	QVT-31	CAQL2449579
Power Supply	W.S.E.	902-PI	96039

Test Conditions / Notes:

The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter spurious level below 30 MHz. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 3) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. Note 4) The EMITEST software used a -10 dB distance correction factor. I added a -10 dB additional correction factor to give a total 40 dB per decade correction factor.

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	Mag L dB	dBuA/ dB	-10 d dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	658.110k	42.8	+10.2	-51.5	-10.0		-10.0	-18.5	31.2	-49.7	None
									Ambient level from radio station at 5th harmonic of TX.		
2	789.710k	39.9	+10.2	-51.5	-10.0		-10.0	-21.4	29.7	-51.1	None
									Ambient level from radio station at 6th harmonic of TX.		
3	921.310k	35.5	+10.2	-51.5	-10.0		-10.0	-25.8	28.3	-54.1	None
									Ambient level from radio station at 7th harmonic of TX.		
4	526.530k	39.0	+10.0	-51.5	-10.0		-10.0	-22.5	33.2	-55.7	None
									Noise floor of test equipment.		

5	3.027M	25.3	+10.4	-51.5	-10.0	-10.0	-35.8	29.5	-65.3	None
6	394.240k	41.8	+10.0	-51.5	-10.0	-10.0	-19.7	55.7	-75.4	None Noise floor of test equipment.
7	263.288k	44.8	+10.0	-51.5	-10.0	-10.0	-16.7	59.2	-75.9	None Noise floor of test equipment.

Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485

Customer: **Westinghouse Security Electronics**
Specification: **FCC 15.109 Class A**
Work Order #: **76537** Date: 04/05/2001
Test Type: **Scan/Maximized Emissions** Time: 15:32:45
Equipment: **Security Card Reader** Sequence#: 5
Manufacturer: W.S.E. Tested By: Art Rice
Model: DR4220
S/N: 002

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Security Card Reader*	W.S.E.	DR4220	002

Support Devices:

Function	Manufacturer	Model #	S/N
Controller (ACU)	Honeywell	NexSentry Controller 4100	none
Terminal	Qume	QVT-31	CAQL2449579
Power Supply	W.S.E.	902-PI	96039

Test Conditions / Notes:

The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter spurious level above 30 MHz. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 3) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. Scanned 30-1000 MHz.

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#		Freq MHz	Rdng dBµV	Bicon dB	Cable dB	Log dB	Pream dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	QP	58.085M	39.8	+9.3	+1.0	+0.0	-26.6	+0.0	23.5	39.1	-15.6	Vert
^		58.064M	41.7	+9.3	+1.0	+0.0	-26.6	+0.0	25.4	39.1	-13.7	Vert
3	QP	57.397M	38.8	+9.5	+1.0	+0.0	-26.6	+0.0	22.7	39.1	-16.4	Vert
^		57.391M	39.9	+9.5	+1.0	+0.0	-26.6	+0.0	23.8	39.1	-15.3	Vert
5	QP	50.716M	34.7	+11.5	+0.9	+0.0	-26.6	+0.0	20.5	39.1	-18.6	Vert
^		50.711M	37.0	+11.5	+0.9	+0.0	-26.6	+0.0	22.8	39.1	-16.3	Vert

7	62.037M QP	37.6	+8.5	+1.0	+0.0	-26.6	+0.0	20.5	39.1	-18.6	Vert
^	62.021M	39.2	+8.5	+1.0	+0.0	-26.6	+0.0	22.1	39.1	-17.0	Vert
9	70.861M QP	36.9	+7.2	+1.0	+0.0	-26.5	+0.0	18.6	39.1	-20.5	Vert
^	70.855M	38.1	+7.2	+1.0	+0.0	-26.5	+0.0	19.8	39.1	-19.3	Vert

Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd. Site A • Hollister, CA 95023 • 831-637-1051

Customer: **Westinghouse Security Electronics**
Specification: **FCC 15.207/15.107**
Work Order #: **76537** Date: 04/05/2001
Test Type: **Conducted Emissions** Time: 17:01:17
Equipment: **Security Card Reader** Sequence#: 8
Manufacturer: W.S.E. Tested By: Art Rice
Model: DR4220
S/N: 002

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Security Card Reader*	W.S.E.	DR4220	002

Support Devices:

Function	Manufacturer	Model #	S/N
Controller (ACU)	Honeywell	NexSentry Controller 4100	none
Terminal	Qume	QVT-31	CAQL2449579
Power Supply	W.S.E.	902-PI	96039

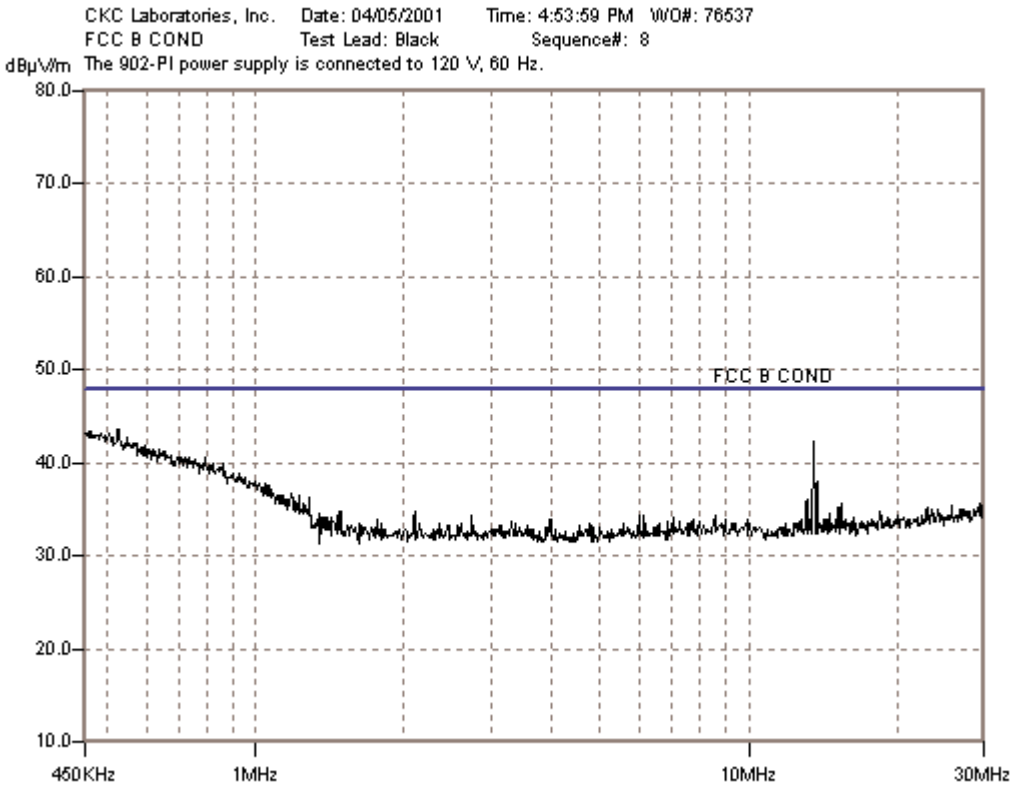
Test Conditions / Notes:

The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter fundamental level. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 4) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. The 902-PI power supply is connected to 120 V, 60 Hz.

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	Cable LISN dB	dB	LISN dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	458.358k	42.9	+0.1 -0.1		+0.5		+0.0	43.4	48.0	-4.6	Black
2	504.327k	42.8	+0.1 -0.1		+0.4		+0.0	43.2	48.0	-4.8	Black
3	485.939k	42.8	+0.1 -0.1		+0.4		+0.0	43.2	48.0	-4.8	Black
4	548.624k	42.4	+0.2 -0.2		+0.4		+0.0	42.8	48.0	-5.2	Black
5	511.849k	42.3	+0.1 -0.1		+0.4		+0.0	42.7	48.0	-5.3	Black
6	13.620M Ambient	41.1	+0.5 +0.4		+0.3		+0.0	42.3	48.0	-5.7	Black
7	597.101k	41.6	+0.2 -0.3		+0.4		+0.0	41.9	48.0	-6.1	Black
8	585.400k	41.3	+0.2 -0.3		+0.4		+0.0	41.6	48.0	-6.4	Black

9	602.116k	41.2	+0.2 -0.3	+0.4	+0.0	41.5	48.0	-6.5	Black
10	580.385k	41.2	+0.2 -0.3	+0.4	+0.0	41.5	48.0	-6.5	Black
11	637.219k	41.1	+0.2 -0.3	+0.4	+0.0	41.4	48.0	-6.6	Black
12	618.832k	41.1	+0.2 -0.3	+0.4	+0.0	41.4	48.0	-6.6	Black
13	608.802k	41.1	+0.2 -0.3	+0.4	+0.0	41.4	48.0	-6.6	Black
14	650.592k	41.0	+0.2 -0.2	+0.3	+0.0	41.3	48.0	-6.7	Black
15	627.190k	41.0	+0.2 -0.3	+0.4	+0.0	41.3	48.0	-6.7	Black
16	655.607k	40.9	+0.2 -0.2	+0.3	+0.0	41.2	48.0	-6.8	Black
17	785.992k	39.9	+0.2 +0.0	+0.4	+0.0	40.5	48.0	-7.5	Black
18	734.172k	40.1	+0.2 -0.1	+0.3	+0.0	40.5	48.0	-7.5	Black
19	715.784k	40.2	+0.2 -0.2	+0.3	+0.0	40.5	48.0	-7.5	Black
20	709.098k	40.2	+0.2 -0.2	+0.3	+0.0	40.5	48.0	-7.5	Black
21	690.710k	40.2	+0.2 -0.2	+0.3	+0.0	40.5	48.0	-7.5	Black
22	754.231k	39.9	+0.2 -0.1	+0.4	+0.0	40.4	48.0	-7.6	Black
23	683.188k	39.9	+0.2 -0.2	+0.3	+0.0	40.2	48.0	-7.8	Black
24	857.035k	39.5	+0.2 +0.0	+0.3	+0.0	40.0	48.0	-8.0	Black
25	816.080k	39.3	+0.2 +0.0	+0.4	+0.0	39.9	48.0	-8.1	Black
26	780.977k	39.2	+0.2 +0.0	+0.4	+0.0	39.8	48.0	-8.2	Black
27	802.708k	39.1	+0.2 +0.0	+0.4	+0.0	39.7	48.0	-8.3	Black
28	871.243k	38.5	+0.2 +0.0	+0.3	+0.0	39.0	48.0	-9.0	Black
29	903.004k	38.4	+0.2 +0.0	+0.3	+0.0	38.9	48.0	-9.1	Black
30	451.580k QP	37.6	+0.1 -0.1	+0.5	+0.0	38.1	48.0	-9.9	Black
31	523.960k QP	36.8	+0.1 -0.2	+0.4	+0.0	37.1	48.0	-10.9	Black
^	526.058k	43.2	+0.1 -0.2	+0.4	+0.0	43.5	48.0	-4.5	Black


CKC Laboratories, Inc. Date: 04/05/2001 Time: 4:53:59 PM WO#: 76537
FCC B COND Test Lead: Black Sequence#: 8
The 902-PI power supply is connected to 120 V, 60 Hz.
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC B COND
450KHz
1MHz
10MHz
30MHz

Test Location: CKC Laboratories, Inc. • 1653 Los Viboras Rd. Site A • Hollister, CA 95023 • 831-637-1051

Customer: **Westinghouse Security Electronics**
Specification: **FCC 15.207/15.107**
Work Order #: **76537** Date: 04/05/2001
Test Type: **Conducted Emissions** Time: 17:12:02
Equipment: **Security Card Reader** Sequence#: 9
Manufacturer: W.S.E. Tested By: Art Rice
Model: DR4220
S/N: 002

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Security Card Reader*	W.S.E.	DR4220	002

Support Devices:

Function	Manufacturer	Model #	S/N
Controller (ACU)	Honeywell	NexSentry Controller 4100	none
Terminal	Qume	QVT-31	CAQL2449579
Power Supply	W.S.E.	902-PI	96039

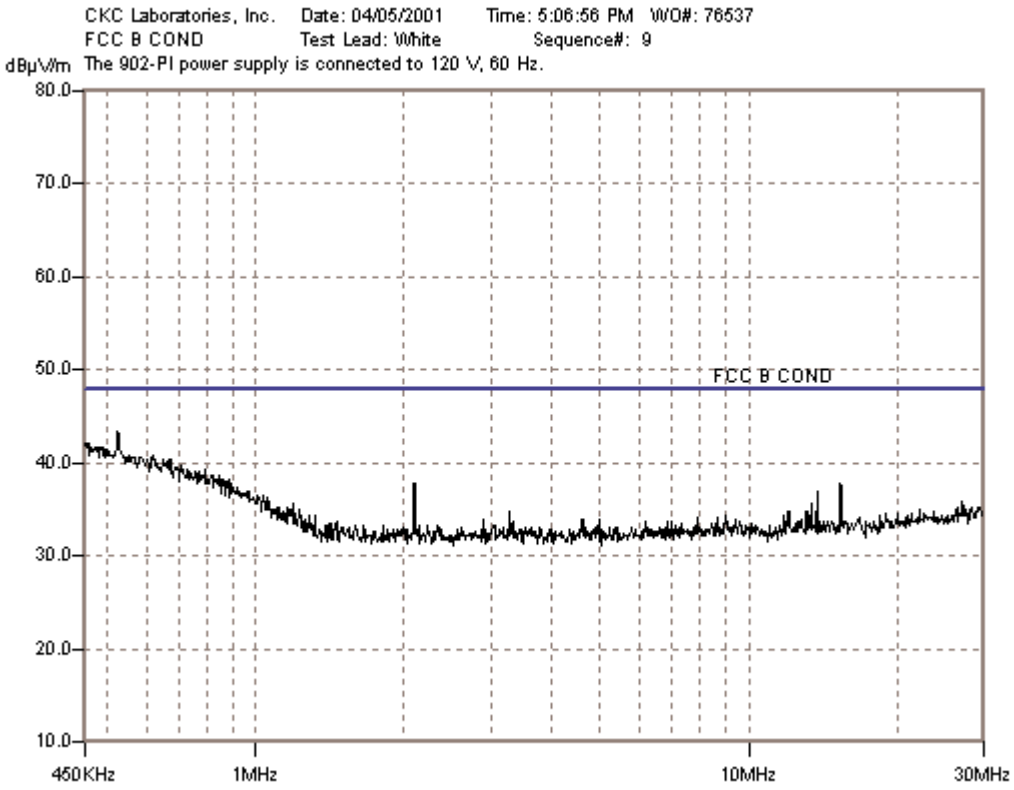
Test Conditions / Notes:

The EUT is a security card reader which transmits an encoded signal at 132 kHz. The signal is intercepted by a security card which sends an encoded response back to the EUT at 66 kHz. The card reader is part of a security system. For this test, typical support equipment is connected to the EUT. The Controller is initialized using the terminal, then the terminal is shut off during the test. A 24 VDC power supply provides power for all devices except the terminal. The power supply is provided by W.S.E. as part of the security system. Note 1) The support equipment is located 15 feet away. The cable is routed up from the EUT to an overhead hanger, then horizontally for 10 feet, then down to the ground where it is routed to the remote support equipment. Note 2) Transmitter fundamental level. The loop antenna dimensions are 30.48 cm x 30.48 cm which calculates to 0.0929 square meters. Note 4) The voltage at the EUT is 26.6 VDC. The temperature is 60°F. Relative humidity is 39 %. The 902-PI power supply is connected to 120 V, 60 Hz.

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	Cable dB	LISN dB	LISN dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	451.672k	42.2	+0.1	+0.6	-0.8	+0.0	42.1	48.0	-5.9	White
2	487.611k	41.9	+0.1	+0.5	-0.8	+0.0	41.7	48.0	-6.3	White
3	463.373k	41.8	+0.1	+0.6	-0.8	+0.0	41.7	48.0	-6.3	White
4	496.805k	41.7	+0.1	+0.5	-0.8	+0.0	41.5	48.0	-6.5	White
5	506.834k	41.5	+0.1	+0.5	-0.8	+0.0	41.3	48.0	-6.7	White
6	619.667k	40.9	+0.2	+0.5	-0.7	+0.0	40.9	48.0	-7.1	White
7	553.639k	40.9	+0.2	+0.5	-0.7	+0.0	40.9	48.0	-7.1	White
8	582.056k	40.6	+0.2	+0.5	-0.7	+0.0	40.6	48.0	-7.4	White

9	562.833k	40.6	+0.2	+0.5	-0.7	+0.0	40.6	48.0	-7.4	White
10	673.994k	40.3	+0.2	+0.4	-0.6	+0.0	40.3	48.0	-7.7	White
11	663.965k	40.3	+0.2	+0.4	-0.6	+0.0	40.3	48.0	-7.7	White
12	650.592k	40.3	+0.2	+0.4	-0.6	+0.0	40.3	48.0	-7.7	White
13	627.190k	40.3	+0.2	+0.5	-0.7	+0.0	40.3	48.0	-7.7	White
14	603.787k	40.3	+0.2	+0.5	-0.7	+0.0	40.3	48.0	-7.7	White
15	612.145k	40.1	+0.2	+0.5	-0.7	+0.0	40.1	48.0	-7.9	White
16	632.204k	40.0	+0.2	+0.5	-0.7	+0.0	40.0	48.0	-8.0	White
17	707.427k	39.8	+0.2	+0.4	-0.6	+0.0	39.8	48.0	-8.2	White
18	685.696k	39.6	+0.2	+0.4	-0.6	+0.0	39.6	48.0	-8.4	White
19	791.006k	39.3	+0.2	+0.4	-0.5	+0.0	39.4	48.0	-8.6	White
20	729.157k	39.2	+0.2	+0.4	-0.6	+0.0	39.2	48.0	-8.8	White
21	767.604k	39.0	+0.2	+0.4	-0.5	+0.0	39.1	48.0	-8.9	White
22	755.903k	38.9	+0.2	+0.4	-0.5	+0.0	39.0	48.0	-9.0	White
23	724.142k	39.0	+0.2	+0.4	-0.6	+0.0	39.0	48.0	-9.0	White
24	742.530k	38.9	+0.2	+0.4	-0.6	+0.0	38.9	48.0	-9.1	White
25	809.394k	38.6	+0.2	+0.4	-0.5	+0.0	38.7	48.0	-9.3	White
26	777.634k	38.6	+0.2	+0.4	-0.5	+0.0	38.7	48.0	-9.3	White
27	841.154k	38.5	+0.2	+0.4	-0.5	+0.0	38.6	48.0	-9.4	White
28	824.438k	38.5	+0.2	+0.4	-0.5	+0.0	38.6	48.0	-9.4	White
29	852.856k	38.1	+0.2	+0.4	-0.4	+0.0	38.3	48.0	-9.7	White
30 QP	527.250k	37.9	+0.1	+0.5	-0.8	+0.0	37.7	48.0	-10.3	White
^	524.386k	43.5	+0.1	+0.5	-0.8	+0.0	43.3	48.0	-4.7	White


CKC Laboratories, Inc. Date: 04/05/2001 Time: 5:06:56 PM WO#: 76537
FCC B COND Test Lead: White Sequence#: 9
The 902-PI power supply is connected to 120 V, 60 Hz.
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC B COND
450KHz
1MHz
10MHz
30MHz