

**KTL Test Report:**

8R00115.2

**Applicant:**

Lectron Technologies Inc.  
1001 Leon Ringuet  
Boucherville, Quebec  
J4B 8E6

**Equipment Under Test:**  
(E.U.T.)

Lectron 20 Receiver

**FCC ID:**

N4S202RECEIVER

**In Accordance With:**

**FCC Part 15, Subpart C**  
Radio Receivers

**Tested By:**

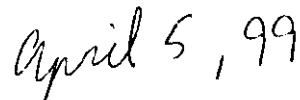
KTL Ottawa Inc.  
3325 River Road, R.R. 5  
Ottawa, Ontario K1V 1H2

**Authorized By:**



Russell Grant, Senior Technologist

**Date:**



**Total Number of Pages:**

20

EQUIPMENT: *Lectron 20 Receiver*  
FCC ID: N4S202RECEIVER

DESCRIPTION OF EQUIPMENT: Super Generative Receiver

MODEL NO.: Lectron 20

SERIAL NO.: Not Applicable

GENERAL:

These test were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart B requirements for Radio Receivers.

The equipment was tested for conducted emissions from 0.45 MHz to 30 MHz using a 50 microhenry line impedance stabilization network (L.I.S.N.) as described in ANSI C63.4-1992. Peripheral equipment was also operated through a 50 microhenry L.I.S.N.

The equipment was tested for radiated emissions in accordance with the requirements of FCC Part 15, Subpart B. Frequencies were initially identified in a large shielded room. Amplitude measurements were made on an outdoor Open Area Test Site. Details of the outdoor site are on file with the FCC.

ABSTRACT:

NAME OF TEST	PARA. NO.	RESULTS
Powerline Conducted Emissions	15.107(a)	Complies
Radiated Emissions	15.109(a)	Complies

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".

NVLAP

NVLAP LAB CODE: 100351-0

TESTED BY:

*Tom Tidwell*  
Tom Tidwell

DATE:

*05 Apr 99*

KTL Ottawa Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. KTL Ottawa Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report applies only to the items tested.

*EQUIPMENT: Lectron 20 Receiver*  
*FCC ID: N4S202RECEIVER*

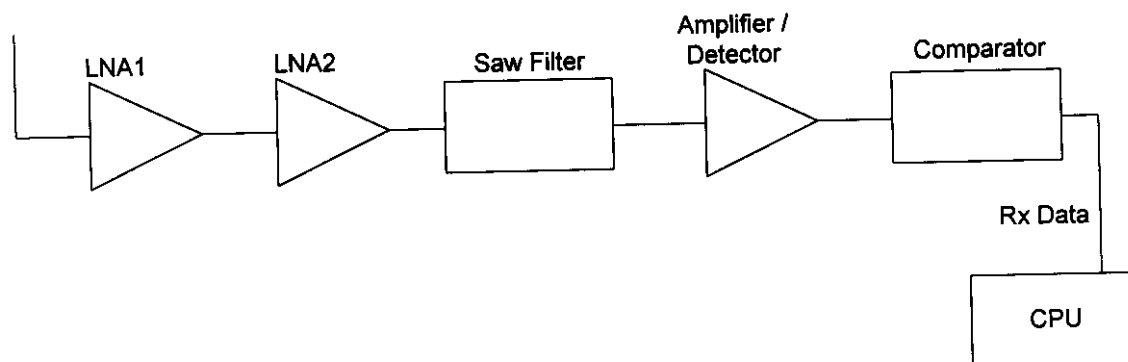
---

**EQUIPMENT DETAILS**

Type of Equipment:	Super Regenerative Receiver
Manufacturer:	Lectron Products
Model No.:	Lectron 20
Serial No.:	Not Applicable
Frequency Range:	315 MHz (Fixed)
No. of Channels:	1
Operating Frequency(ies) of Sample:	315 MHz
Crystal Frequency(ies):	Not Applicable
Primary Power Requirement:	12 Vdc via AC Adaptor
Bandwidth and Emission Designator:	60K0L1D
Intermediate Frequency(ies):	Not Applicable

*EQUIPMENT: Lectron 20 Receiver*  
FCC ID: N4S202RECEIVER

**THEORY OF OPERATION**



*EQUIPMENT: Lectron 20 Receiver*  
*FCC ID: N4S202RECEIVER*

---

### **JUSTIFICATION**

The E.U.T. was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration:

- (1) The E.U.T. was tested in three orthogonal axis.

### **EXERCISE PROGRAM**

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise mode:

- (1) The E.U.T. was cohered with an on-channel CW signal.

### **EQUIPMENT MODIFICATIONS**

To achieve compliance the following change(s) were made by (Certelem) (customer) during compliance testing: Not Applicable

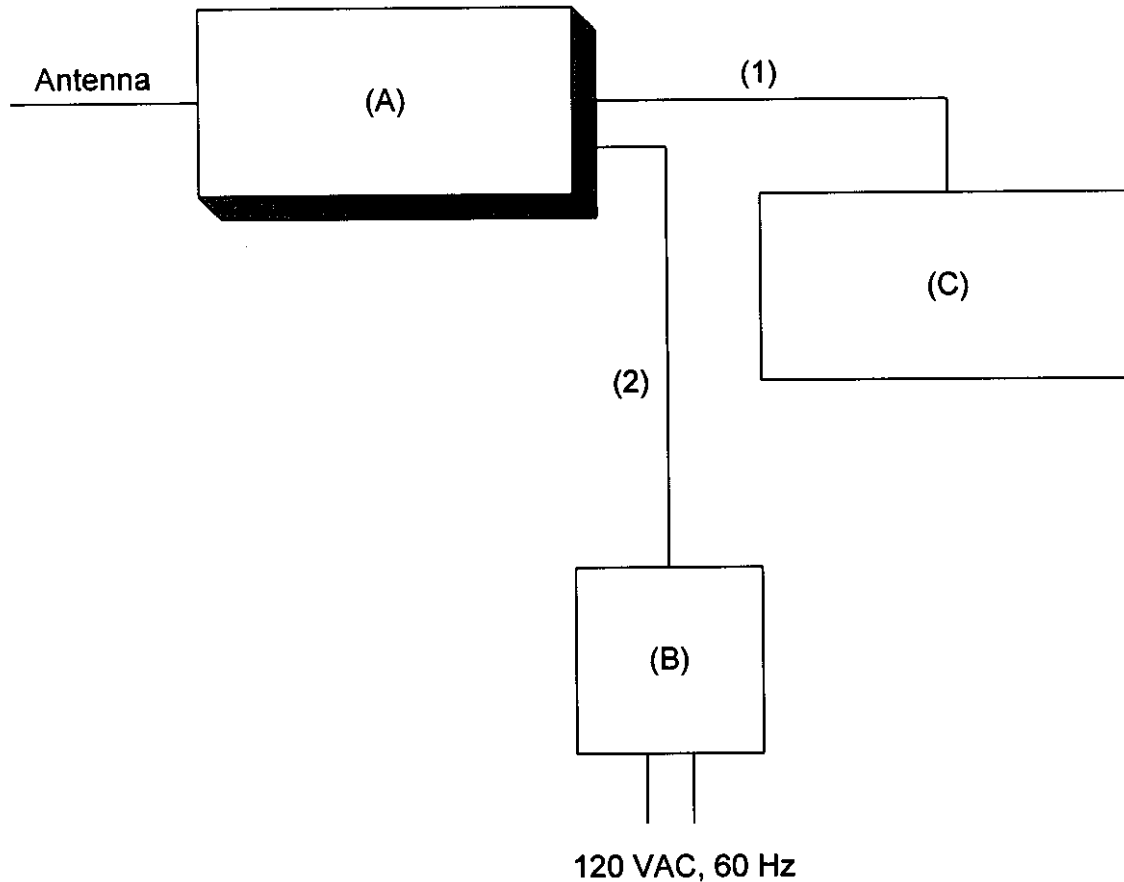
EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER

**Equipment Configuration List:**

Item	Description	FCC ID:	Model No.	Serial.	Rev.
(A)	Receiver	None	Lectron 20	None	
(B)	AC Adaptor	None	None	None	
(C)	Loop Simulator	None	CLI-1	None	

**Inter-connection Cables**

Item	Description	Length (m)
(1)	4 Conductor Phone Cord	3.0
(2)	2 Conductor Power Cable	2.5

**Configuration of the Equipment Under Test (E.U.T)**

*EQUIPMENT: Lectron 20 Receiver*  
*FCC ID: N4S202RECEIVER*

---

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.107(a)
TESTED BY: Tom Tidwell	DATE: June 24, 1998

TEST CONDITIONS:      Standard Temperature and Humidity:  
                                 Standard Test Voltage:

MINIMUM STANDARD:    The RF energy fed back into the power lines shall not  
                                 exceed 48 dB $\mu$ V on any frequency between 0.45 MHz and  
                                 30 MHz inclusive.

TEST RESULTS:            Complies. See attached graphs.

MEASUREMENT DATA:   See attached graphs.

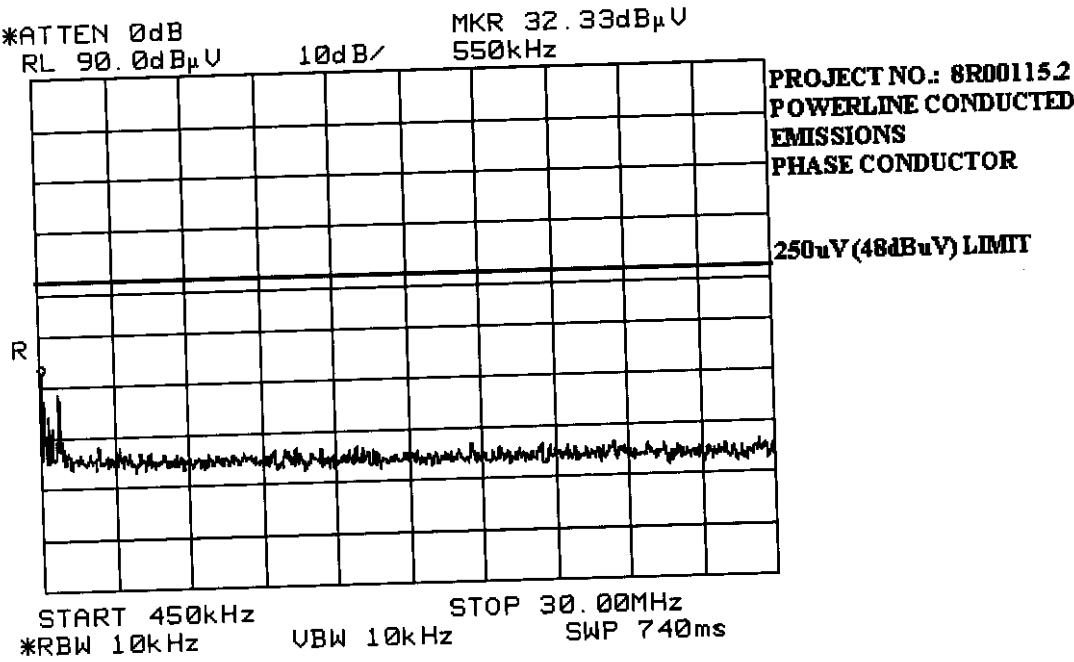
Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak detector.

Broadband emissions are identified by switching the receiver detector function from Quasi-Peak to Average. If the amplitude of the emission drops by 6 dB or more then the emission is classified as broadband and the Quasi-Peak level is reduced by a factor of 13 dB.

KTL Ottawa

FCC PART 15, SUBPART C  
RADIO RECEIVERS  
PROJECT NO.: 8R00115.2

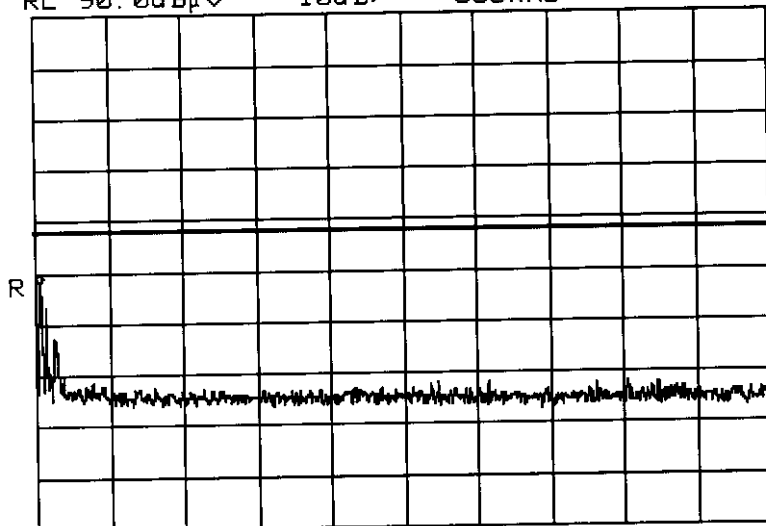
EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER





EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER

\*ATTEN 0dB MKR 38.00dB $\mu$ V  
RL 90.0dB $\mu$ V 10dB/ 600kHz



PROJECT NO.: 8R00115.2  
POWERLINE CONDUCTED  
EMISSIONS  
NEUTRAL CONDUCTOR

250uV (48dBuV) LIMIT

START 450kHz STOP 30.00MHz  
\*RBW 10kHz VBW 10kHz SWP 740ms

EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(a)
TESTED BY: Tom Tidwell	DATE: June 25, 1998

TEST CONDITIONS: Outdoor Range  
Standard Test Voltage

## MINIMUM STANDARD:

Frequency(MHz)	Field Strength(dB $\mu$ V/m @3m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

TEST RESULTS: Complies. The worst-case emission level is 38.7 dB $\mu$ V/m @ 3m at 305.097 MHz. This is 7.3 dB below the specification limit.

MEASUREMENT DATA: See attached table.

The equipment was prescanned in a shielded room using a spectrum analyzer and broadband antenna. A list of frequencies was compiled for investigation in the open field. The equipment was then moved to an open area test site where amplitude measurements were made at a distance of 3 meters. The bandwidth was set to 120 kHz and the detector function was CISPR Quasi-Peak. Any emission within 6 dB of the specification limit is re-measured using a reference tuned dipole antenna per ANSI C63.4.

FCC ID: N4S202RECEIVER

[illegible]

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole

**\*\*** Includes cable loss when amplifier is not used.

(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak (3) 100 kHz RBW, 300 kHz VBW, Peak (4) 300 kHz RBW, 1 MHz VBW, Peak  
(5) 1 MHz RBW, 3 MHz VBW, Peak (6) 1 MHz RBW, 10 Hz VBW, Peak

EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(a)
TESTED BY:	DATE:

TEST CONDITIONS: Outdoor Range  
Standard Test Voltage

MINIMUM STANDARD: Equipment manufactured or imported before June 23, 1999  
is permitted the following limits.

Frequency(MHz)	Field Strength( $\mu\text{V/m}@3\text{m}$ )
30 - 70	520(50.1 dB $\mu\text{V/m}$ )
70 - 130	500(54.0 dB $\mu\text{V/m}$ )
130 - 174	500 - 1500
174 - 260	1500(63.5 dB $\mu\text{V/m}$ )
260 - 470	1500 - 5000(linear interpolation)
Above 470	5000(74.0 dB $\mu\text{V/m}$ )

TEST RESULTS: \_\_\_\_\_ complies. The worst-case emission level is \_\_\_\_\_ dB $\mu\text{V/m}$   
@ \_\_\_\_\_ MHz. This is \_\_\_\_\_ dB below the  
specific \_\_\_\_\_ limit.

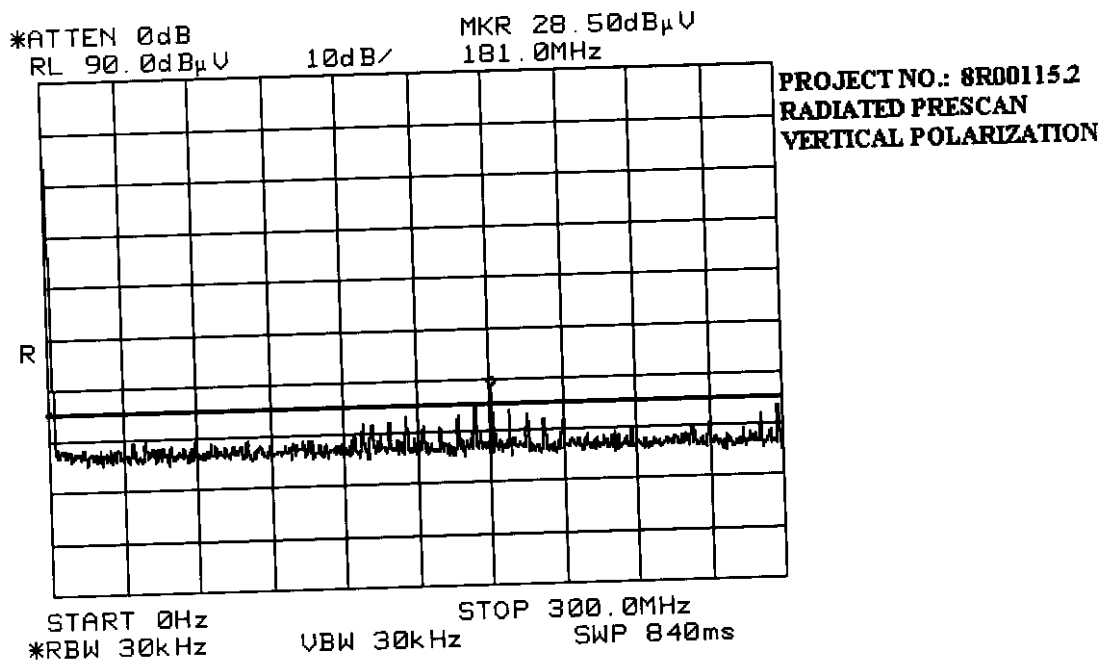
MEASUREMENT DATA: See attached table.

The equipment was prescanned in a shielded room using a spectrum analyzer and broadband antenna. A list of frequencies was compiled for investigation in the open field. The equipment was then moved to an open area test site where amplitude measurements were made at a distance of 3 meters. The bandwidth was set to 120 kHz and the detector function was CISPR Quasi-Peak. Any emission within 6 dB of the specification limit is re-measured using a reference tuned dipole antenna per ANSI C63.4.

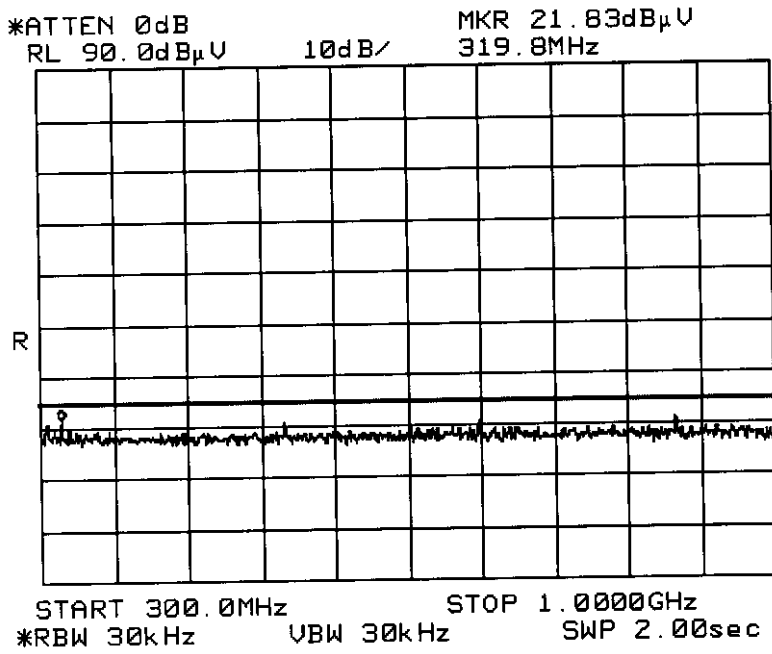
KTL Ottawa

FCC PART 15, SUBPART C  
RADIO RECEIVERS  
PROJECT NO.: 8R00115.2

EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER



EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER

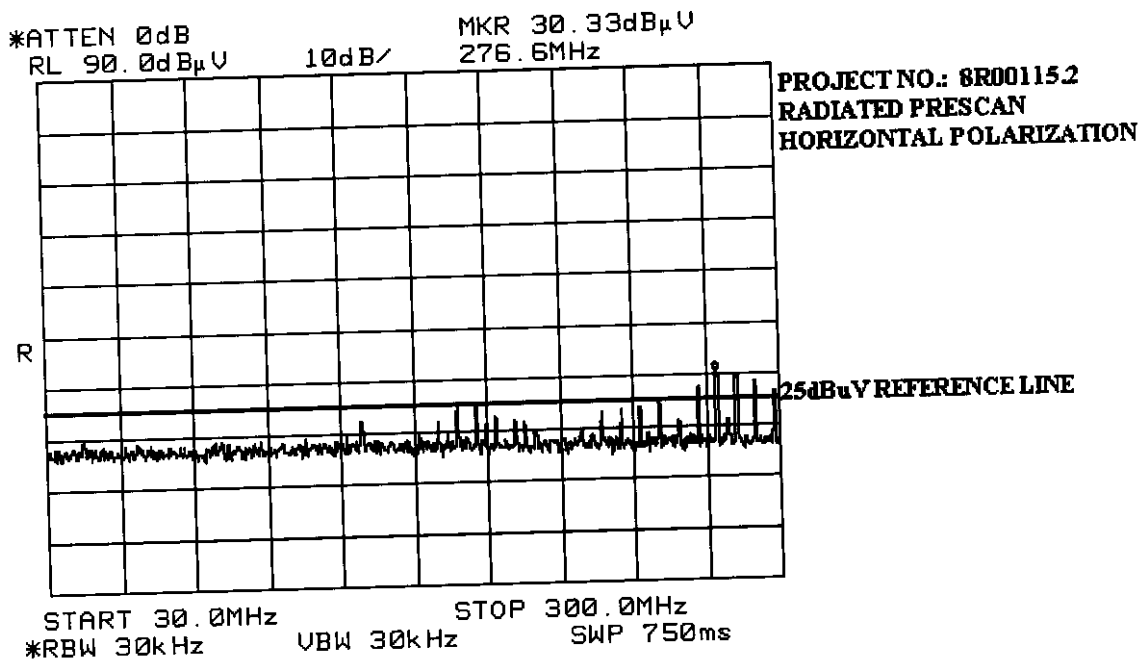


PROJECT NO.: 8R00115.2  
RADIATED PRESCAN  
VERTICAL POLARIZATION

KTL Ottawa

FCC PART 15, SUBPART C  
RADIO RECEIVERS  
PROJECT NO.: 8R00115.2

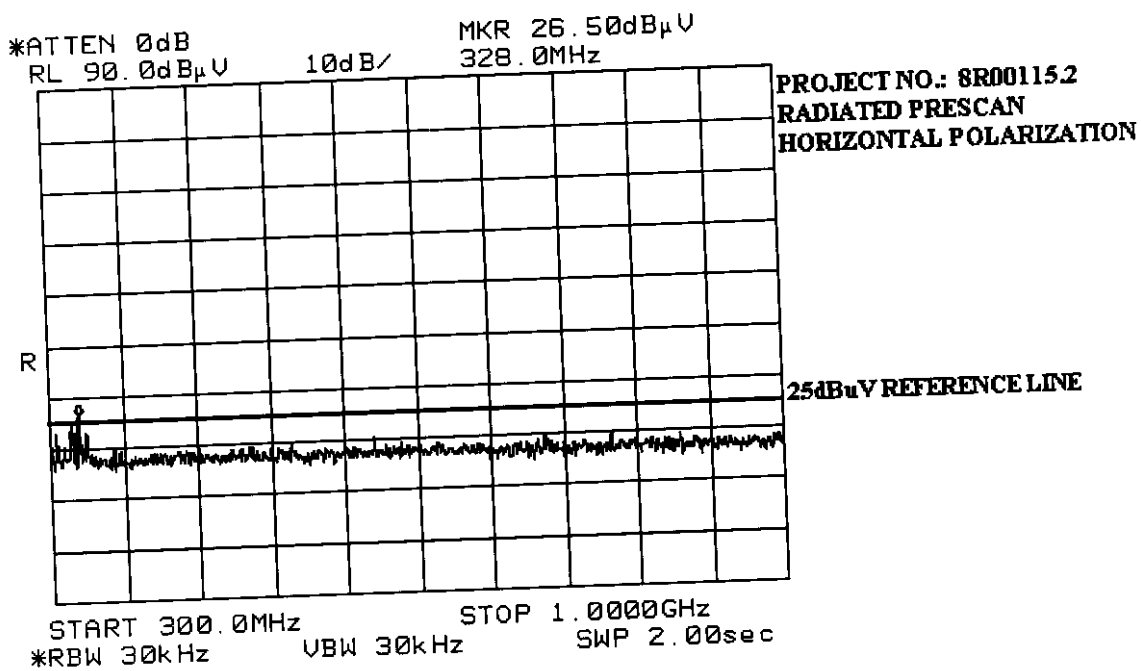
EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER



KTL Ottawa

FCC PART 15, SUBPART C  
RADIO RECEIVERS  
PROJECT NO.: 8R00115.2

EQUIPMENT: Lectron 20 Receiver  
FCC ID: N4S202RECEIVER

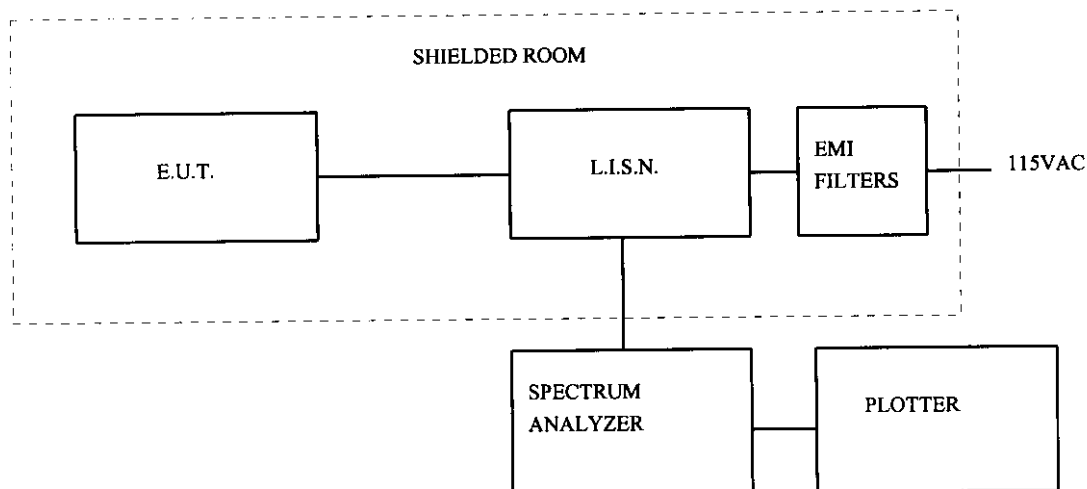




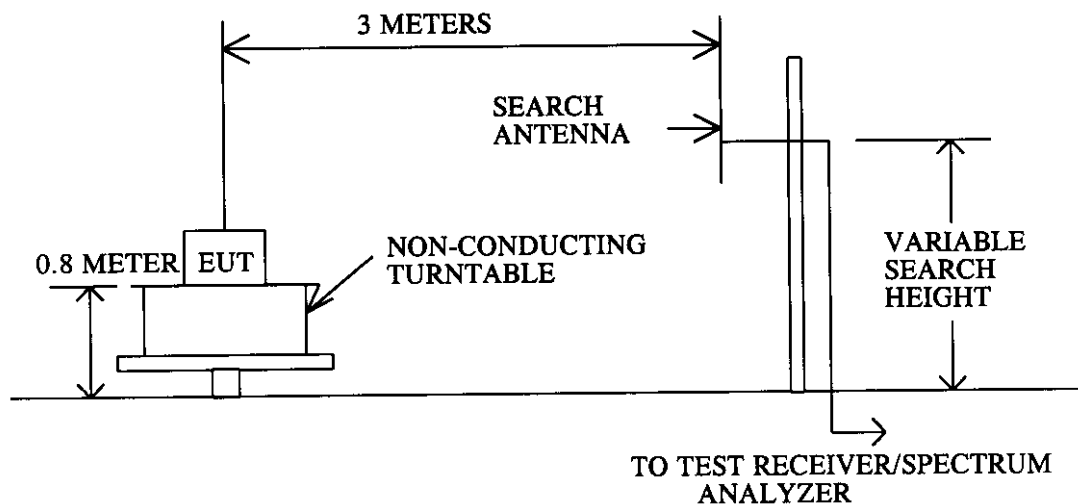
EQUIPMENT: *Lectron 20 Receiver*  
FCC ID: *N4S202RECEIVER*

### BLOCK DIAGRAMS

#### POWERLINE CONDUCTED EMISSIONS



#### TEST SITE FOR RADIATED EMISSIONS



For Super Regenerative Receivers the receiver was activated using a tuned dipole antenna fed with a CW signal. The frequency of the activating signal is adjusted to obtain worst-case field strength of the EUT oscillator emission.

The spectrum was searched to the 10<sup>th</sup> harmonic of the fundamental frequency.

EQUIPMENT: *Lectron 20 Receiver*  
FCC ID: *N4S202RECEIVER*

---

**TEST EQUIPMENT LIST****Equipment List - Radiated Emissions**

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	Mar. 31/98	Mar. 31/99
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	2311A02238	Sept. 30/97	Sept. 30/98
1 Year	Spectrum Analyzer Display	Hewlett-Packard	8566B	2314A04759	Sept. 30/97	Sept. 30/98
1 Year	Biconical (2) Antenna	EMCO	3109	9503-2894	June 2/98	June 2/99
2 Year	Horn Antenna	EMCO	3115	3132	Feb. 9/98	Feb.9/00
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Oct. 24/97	Oct. 24/98

Note: N/A = Not Applicable  
NCR = No Cal Required