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**Test Report:** 81968-1TRFWL

**Applicant:** Kaba Ilco Corp  
2941 Indiana Ave.  
Winston-Salem, NC  
27105 USA

**Apparatus:** EPLEX 5800 and 5900

**FCC ID:** FCC ID # U9B58005900

**In Accordance With:** FCC Part 15 Subpart C, 15.225  
Operation within the band 13.110-14.010 MHz

**Tested By:** Nemko Canada Inc.  
303 River Road  
Ottawa, Ontario  
K1V 1H2

**Authorized By:**   
Jin Xu, Wireless Specialist

**Date:** July 25, 2007

**Total Number of Pages:** 17

## Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

|                                |                               |
|--------------------------------|-------------------------------|
| <b>Apparatus Assessed:</b>     | EPLEX 5800 and 5900           |
| <b>Specification:</b>          | FCC Part 15 Subpart C, 15.225 |
| <b>Compliance Status:</b>      | Complies                      |
| <b>Exclusions:</b>             | None                          |
| <b>Non-compliances:</b>        | None                          |
| <b>Report Release History:</b> | Original Release              |

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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## Section 1 : Equipment Under Test

### 1.1 Product Identification

The Equipment Under Test was identified as follows:

EPLEX 5800 and 5900

### 1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

| Sample No. | Description | Serial No. |
|------------|-------------|------------|
| 1          | EPLEX 5800  | None       |
|            |             |            |
|            |             |            |

The first samples were received on: February 27, 2007

### 1.3 Theory of Operation

The apparatus is a 13.56MHz RFID reader, which is attached to a secure lock. Whenever a known card is brought in proximity to the reader it will grant access through the door. The E- PLEX 5800 and E- PLEX 5900 are two physically identical products that basically only differs by their application firmware, in terms of access rules. They both share the same basic operation. Only the high level application access rules differs. They use the exact same electronic and mechanics.

### 1.4 Technical Specifications of the EUT

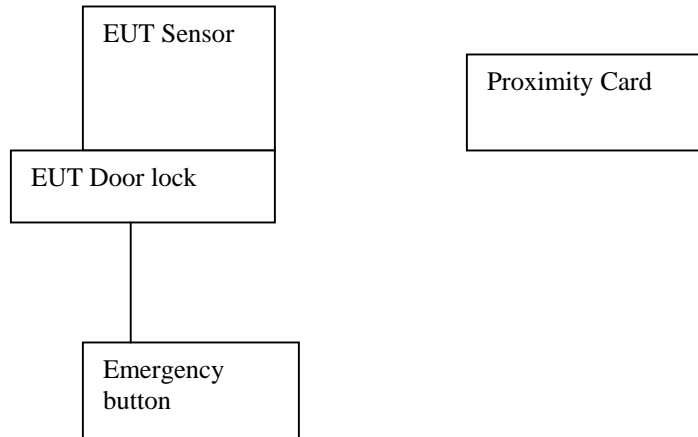
**Operating Frequency:** 13.56MHz

**Emission Designator** PON

**Modulation:** Pulse Modulated

**Antenna Data:** Integral

### 1.5 Block Diagram of the EUT



## Section 2 : Test Conditions

### 2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.225

Operation within the band 13.110-14.010 MHz

### 2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

### 2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range : 15 – 30 °C  
 Humidity range : 20 - 75 %  
 Pressure range : 86 - 106 kPa  
 Power supply range : +/- 5% of rated voltages

### 2.4 Test Equipment

| Equipment               | Manufacturer    | Model No. | Asset/Serial No. | Next Cal.   |
|-------------------------|-----------------|-----------|------------------|-------------|
| Spectrum Analyzer       | Rohde & Schwarz | FSP40     | FA001920         | Mar 17/07   |
| Temperature Chamber     | Thermotron      | SM-16C    | FA001030         | NCR         |
| Fluke                   | Multimeter      | 16        | FA001831         | Jan 10/08   |
| Fluke                   | Air probe       | None      | FA001248         | NCR         |
| Biconical (1) Antenna   | EMCO            | 3109      | FA000805         | May 03/07   |
| Log Periodic Antenna #1 | EMCO            | LPA-25    | FA000477         | Sept. 12/07 |
| Loop Antenna            | EMCO            | 6502      | FA001686         | Jul 17/07   |

COU – Calibrate on Use

NCR – No Calibration Required

## **Section 3 : Observations**

### **3.1 Modifications Performed During Assessment**

No modifications were performed during assessment.

### **3.2 Record Of Technical Judgements**

No technical judgements were made during the assessment.

### **3.3 EUT Parameters Affecting Compliance**

The user of the apparatus could not alter parameters that would affect compliance.

### **3.4 Test Deleted**

No Tests were deleted from this assessment.

### **3.5 Additional Observations**

There were no additional observations made during this assessment.

## **Section 4 : Results Summary**

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.



**4.1 FCC Part 15 Subpart C : Test Results**

| Part 15   | Test Description  | Required | Result |
|-----------|---|----------|--------|
| 15.31(e)  | Variation of power supply   | N        |        |
| 15.207(a) | Powerline Conducted Emissions   | N        |        |
| 15.215(c) | 20dB Bandwidth  | Y        | PASS   |
| 15.225(a) | Field Strength in the 13.553-13.567 MHz band                                    | Y        | PASS   |
| 15.225(b) | Field Strength in the 13.410-13.553 MHz and 13.567-13.710 MHz MHz bands         | N        |        |
| 15.225(c) | Field Strength in the 13.110-13.410 MHz and 13.710-14.010 MHz bands             | N        |        |
| 15.225(d) | Field Strength of any emissions appearing outside of the 13.110-14.010 MHz band | Y        | PASS   |
| 15.225(e) | Frequency tolerance of the carrier signal                                       | Y        | PASS   |
| 15.225(f) | Radio frequency powered tags  | N        |        |

Notes:

## Appendix A : Test Results

### Clause 15.215(c) 20dB Bandwidth

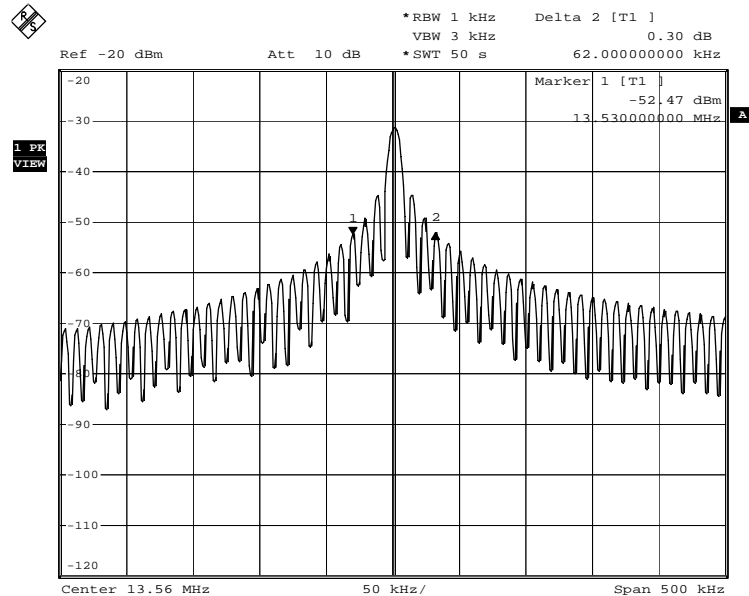
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

#### Test Conditions:

|                            |               |                          |             |
|----------------------------|---------------|--------------------------|-------------|
| <b>Sample Number:</b>      | 1             | <b>Temperature (°C):</b> | 23          |
| <b>Date:</b>               | March 1, 2007 | <b>Humidity (%):</b>     | 19          |
| <b>Modification State:</b> | 0             | <b>Tester:</b>           | Jason Nixon |
|                            |               | <b>Laboratory:</b>       | Wireless    |

**Test Results:** See Attached Plots.

#### 20dB Bandwidth:



20dB Bandwidth

Date: 1.MAR.2007 09:48:54

**Clause 15.225(a) Field Strength in the 13.553-13.567 MHz band**

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

**Test Conditions:**

|                            |               |                          |             |
|----------------------------|---------------|--------------------------|-------------|
| <b>Sample Number:</b>      | 1             | <b>Temperature (°C):</b> | 10          |
| <b>Date:</b>               | March 1, 2007 | <b>Humidity (%):</b>     | 43          |
| <b>Modification State:</b> | 0             | <b>Tester:</b>           | Jason Nixon |
|                            |               | <b>Laboratory:</b>       | OATS        |

**Test Results:** See Attached table.

| Frequency (MHz) | Received (dBuV/m) | Af (dB) | Cable Loss (dB) | Measured @ 1m (dBuV/m) | Measured @ 30m (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|-------------------|---------|-----------------|------------------------|-------------------------|----------------|-------------|
| 13.56           | 65.39             | 10.6    | 0.47            | 76.46                  | 17.39                   | 84             | 66.64       |

**Additional Notes:**

Measurements were performed at 1m using a Peak detector with 10kHz RBW/30kHz VBW.

The loop antenna was rotated 360° about its axis.

The EUT used fresh new batteries.

Measurements were corrected to 30m using  $40\log(1/30) = -59.1\text{dB}$

**Clause 15.225(d) Field Strength of any emissions appearing outside of the 13.110-14.010 MHz band**

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209

15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 0.009-0.490     | 2400/F (kHz)                      | 300                           |
| 0.490-1.705     | 24000/F (kHz)                     | 30                            |
| 1.705-30.0      | 30                                | 30                            |
| 30-88           | 100                               | 3                             |
| 88-216          | 150                               | 3                             |
| 216-960         | 200                               | 3                             |
| Above 960       | 500                               | 3                             |

**Test Conditions:**

|                            |               |                          |             |
|----------------------------|---------------|--------------------------|-------------|
| <b>Sample Number:</b>      | 1             | <b>Temperature (°C):</b> | 10          |
| <b>Date:</b>               | March 1, 2007 | <b>Humidity (%):</b>     | 43          |
| <b>Modification State:</b> | 0             | <b>Tester:</b>           | Jason Nixon |
|                            |               | <b>Laboratory:</b>       | OATS        |

**Test Results:** See attached Table

**Additional Observations:**

The Spectrum was searched from 9kHz to 1GHz.

The EUT used fresh new batteries.

All measurements were performed at 3m using a Peak detector with 10kHz RBW/30kHz VBW below 30MHz, a Peak detector with 100kHz RBW/300kHz VBW above 30MHz

| Freq. (MHz) | Ant | Pol. V/H | RCVD Signal (dB $\mu$ V) | Ant. Factor (dB) | Amp. Gain (dB) | Cable Loss (dB) | Level (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) |
|-------------|-----|----------|--------------------------|------------------|----------------|-----------------|--------------------|--------------------|-------------|
| 206.3381    | BC2 | V        | 21.9                     | 15.6             | N/A            | 1.5             | 39.0               | 43.5               | 4.5         |
| 206.3381    | BC2 | H        | 20.0                     | 15.0             | N/A            | 1.5             | 36.5               | 43.5               | 7.0         |
| 447.5367    | LP1 | V        | 18.7                     | 16.5             | N/A            | 2.2             | 37.4               | 46.0               | 8.6         |
| 447.5367    | LP1 | H        | 18.9                     | 16.8             | N/A            | 2.2             | 37.9               | 46.0               | 8.1         |
| 629.9549    | LP1 | V        | 15.1                     | 19.8             | N/A            | 2.6             | 37.5               | 46.0               | 8.5         |
| 629.9549    | LP1 | H        | 21.3                     | 20.3             | N/A            | 2.6             | 44.2               | 46.0               | 1.8         |
| 619.8900    | LP1 | V        | 23.1                     | 19.3             | N/A            | 2.5             | 44.9               | 46.0               | 1.1         |
| 619.8900    | LP1 | H        | 20.3                     | 20.1             | N/A            | 2.5             | 42.9               | 46.0               | 3.1         |

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole

**Clause 15.225(e) Frequency tolerance of the carrier signal**

The frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

**Test Conditions:**

|                            |               |                          |             |
|----------------------------|---------------|--------------------------|-------------|
| <b>Sample Number:</b>      | 1             | <b>Temperature (°C):</b> | 22          |
| <b>Date:</b>               | March 1, 2007 | <b>Humidity (%):</b>     | 19          |
| <b>Modification State:</b> | 0             | <b>Tester:</b>           | Jason Nixon |
|                            |               | <b>Laboratory:</b>       | Wireless    |

**Test Results:**

| <b>Conditions</b> | <b>Frequency (Hz)</b> | <b>Offset (ppm)</b> |
|-------------------|-----------------------|---------------------|
| +50°C             | 13561275.000          | -29.5               |
| +40°C             | 13561406.250          | -19.8               |
| +30°C             | 13561675.000          | 0.0                 |
| +20°C             | 13561675.000          | —                   |
| +10°C             | 13561700.000          | 1.8                 |
| 0°C               | 13561668.750          | 0.5                 |
| -10°C             | 13561781.250          | 7.8                 |
| -20°C             | 13561837.500          | 12.0                |

**Additional Notes:**

Limit: +/-0.01% = +/-100ppm

The apparatus is battery powered, therefore the supply variation was not required.

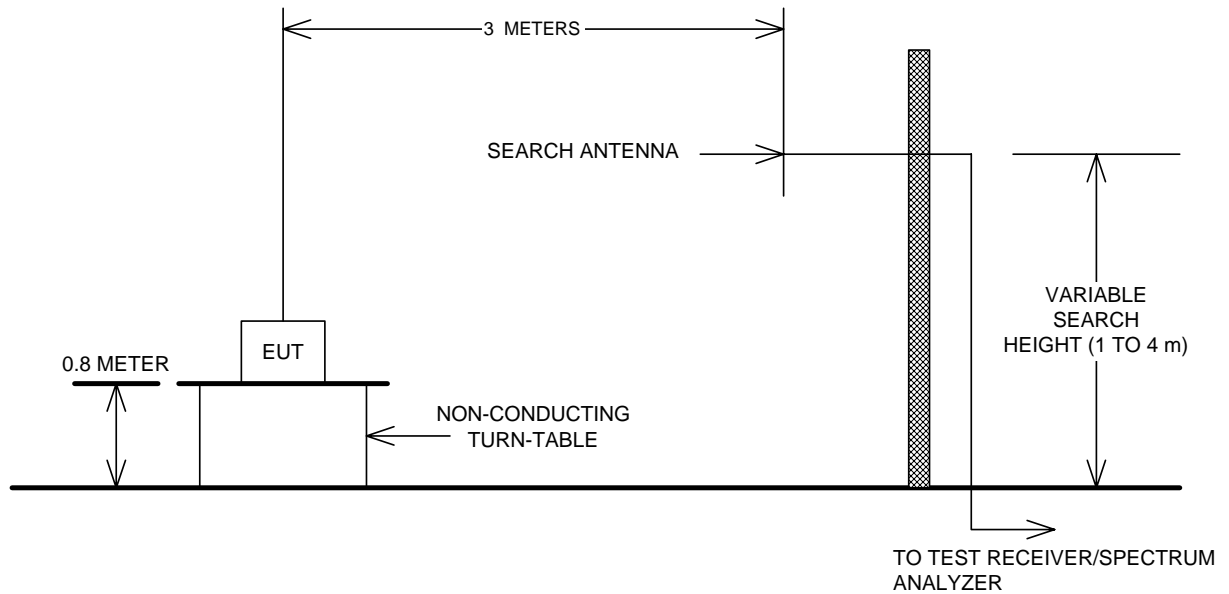
## Appendix B : Setup Photographs

### Spurious Emissions Setup:



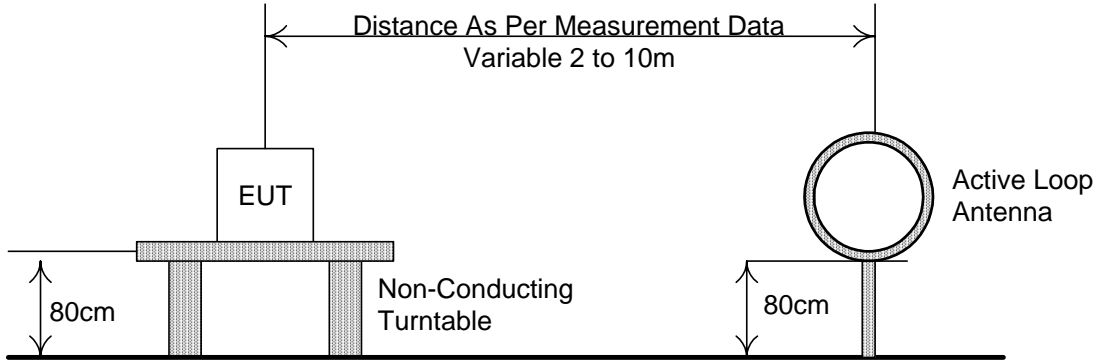
### Appendix C : Block Diagram of Test Setups

#### Test Site For Radiated Emissions above 30MHz





### Emissions below 30MHz



Open Area Test Site – Flat Level Area – Asphalt Surface – Clear Of Obstacles

### Frequency Stability

