# EMISSION MEASUREMENTS IN ACCORDANCE WITH FCC PART 15 AND ANSI C63.4-1992 OF A DECODING RECEIVER, INTENDED FOR USE IN AN INDUCTIVE LAPTIMING SYSTEM, BRAND AMB, TYPE AMBrc DECODER.

**FCC ID: NXYAMBGP4**

FCC report layout endorsed by the FCC by
Public Notice of March 11, 1992.

| | |
|---|---|
| Accredited by | :STERLAB accreditation number L029<br>D.A.R., TTI-P-G.127/96-00 |
| Competent body | :Article 10-2 EMC Directive |
| Notified body nr. 0122 | :Article 10-5 EMC Directive<br>Low Voltage Directive<br>TTE Directive |
| Certification body | :Electrical Products Safety regulation,<br>Hong Kong |
| Designated laboratory | :TTE Directive |
| Notified test service | :Automotive Directive |
| FCC listed | :31040/SIT |
| VCCI registered | :R-592<br>C-607 |

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# MEASUREMENT/TECHNICAL REPORT

## AMB i.t. Holding B.V.

## FCC ID: NXYAMBGP4

Date: July 25, 2000

| | | | |
|---|---|---|---|
| This report concerns: ~~Verification~~ / ~~Notification~~ / Certification<br><br>Equipment type: unintentional radiator, receiver | | | |
| Deferred grant requested per 47 CFR 0.457(d)(1)(ii) No<br><br>If yes defer until: not applicable | | | |
| Transition Rules Request per 15.37: No | | | |
| Report prepared by: | Name | : | D.S. Sariredjo, B.Sc.E.E. |
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| | Country | : | The Netherlands |
| | Email | : | et-desk@nmi.nl |

The data taken for this test and report herein was done in accordance with FCC Part 15 and ANSI C63.4-1992 measurements. NMi Certin B.V.. location Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission-profile of the Equipment Under Test (EUT) on the date of the test noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: July 25, 2000 Signature:

J.S. Sikkema, B.Sc.E.E.
Department EMC and Telecommunication

# Table of contents

# 1 General Information.

## 1.1 Product description.

The product tested is part of an inductive laptiming system. The inductive laptiming system may include transponders, brand AMB, model number AMBrc Transponder, AMBrc_DP, AMBrc F102-RP5, a receiver model AMBrc Decoder and a battery charger, brand AMB, model number Charge Rack.

## 1.2 Related Submittal(s)/grant(s).

The related similar submittals are: FCC ID: NXYAMBGP1 (transponder type AMBrc Transponder) and NXYAMBGP2 (transponder type AMBrc _DP), NXYAMBGP3 (Transponder type AMBrc F102RP-5) NXYAMBGP4 (receiver type AMBrc Decoder).

## 1.3 Test Methodology.

The Test methodology of ANSI C63.4-1992 has been applied to provide adequate measuring data.

Complete data of the tested model has been recorded.

According to FCC Part 15, § 101 the EUT shall be classified as an unintentional radiator (receiver).

## 1.4 Test facility.

The FCC has per Public Notice declared that the measurement facilities located at the NMi Certin B.V. testsite Niekerk, Smidshornerweg 18, The Netherlands, have been reviewed and found to be in compliance with the requirements of section 2.948 (previously section 15.38) of the FCC rules per August 4, 1994.

The description of the measuring facilities have been filed with reference 31040/SIT, 1300B3 at the FCC's Offices.

## 1.5 List of measurement equipment.

| NMi number | Description | Marketing name | Type |
|---|---|---|---|
| 14277 | Antennamast 4m | Heinrich Deisel | HD100 |
| 14278 | Controller OATS | Heinrich Deisel | MA240 |
| 14340 | Biconilog antenna 20MHz - 1100MHz | EMCO | 3143 |
| 12473 | Log-per antenna 200MHz - 1000MHz | Eaton | 96005 |
| 12471 | Biconical antenna 20MHz - 200MHz | Eaton | 94455-1 |
| 12636 | Plastic measurement room | Polyforce | - |
| 13886 | Open Area Test Site | Comtest | - |
| 99108 | Turntable OATS | Heinrich Deisel | HD050 |
| 15667 | Measuring receiver 9kHz - 2750MHz | Rohde & Schwarz | ESCS30 |
| 12507 | Artificial mains network 3-phase | Rohde & Schwarz | ESH2-Z5 |
| 13313 | Impuls limiter | Rohde & Schwarz | ESH3Z2.357... |
| 99115 | Voltage probe | Schwarzbeck | TK9416 |
| 12470 | Magnetic loop antenna 1kHz - 30MHz | Emco | model 6507 |
| 12510 | FCC LISN | Emco | model 3725/2 |

### 1.6 Bandwidth and antenna factors.

The utilized measuring equipment is stated in § 1.5. The bandwidth of the receiver switches automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. Also the antenna factors are included in the testreceiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate correction factor for the cable loss. The total correction is automatically added to the measured value.

## 2 Product labelling.

The following text shall be attached to the EUT, by means of a label, or -in case the enclosure is too small- on a prominent location in the users manual.

**This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The dimensions of the label, the location of the label and the type of font can be found in the FCC regulation book CFR 47, parts 0 to 19, revised as per October 1, 1997.

# 3 System test configuration.

## 3.1 Justification.

The measurements on the AMBrc decoder were carried out in combination with the AMBrc Transponder in order to simulate a real-life application. The AMBrc decoder was constantly active during all measurements. During radiated emission measurements the turntable was rotated in order to find the maximum radiated emission on each frequency.

In accordance with § 11.2.4. of ANSI C63.4-1992 the placing and manipulation of interface cables has been carried out.

## 3.2 Equipment modifications.

Not applicable.

## 3.3 Description of tested EUT.

### 3.3.1 AMBrc decoder

| | | |
|---|---|---|
| Unit title | : | Decoder receiver for laptiming system |
| Model number | : | AMBrc Decoder |
| Part number | : | n.a. |
| FCC ID number | : | NXYAMBGP4 |
| Frequency range | : | 5.0 MHz |
| Description/details | : | see section 3.1 of this report and the exhibits to the application |
| Clock Oscillator(s) | : | 12, 16, 40MHz (xtal clocks for digital part of receiver |
| Cabinet & Screening | : | Metal enclosure (Decoder). |
| Interface Cable(s) | : | Shielded antenna cable, headphone, +12 VDC, RS-232 and USB |
| Method of screening | : | Not applicable |
| Method of grounding | : | Not applicable |
| Operating configuration | : | Decoding received signal from transponder type AMBrc Transponder |

| | | |
|---|---|---|
| Applicant's representative | : | F. Hin |
| Company | : | AMB i.t. Holding B.V. |
| Address | : | Herenweg 29A |
| Postal code and city | : | 2105 MB HEEMSTEDE |
| Country | : | The Netherlands |
| Telephone number | : | +31 (0)23 5291893 |
| Telefax number | : | +31 (0)23 5290156 |

Configuration information including details on interconnecting cable is given below:

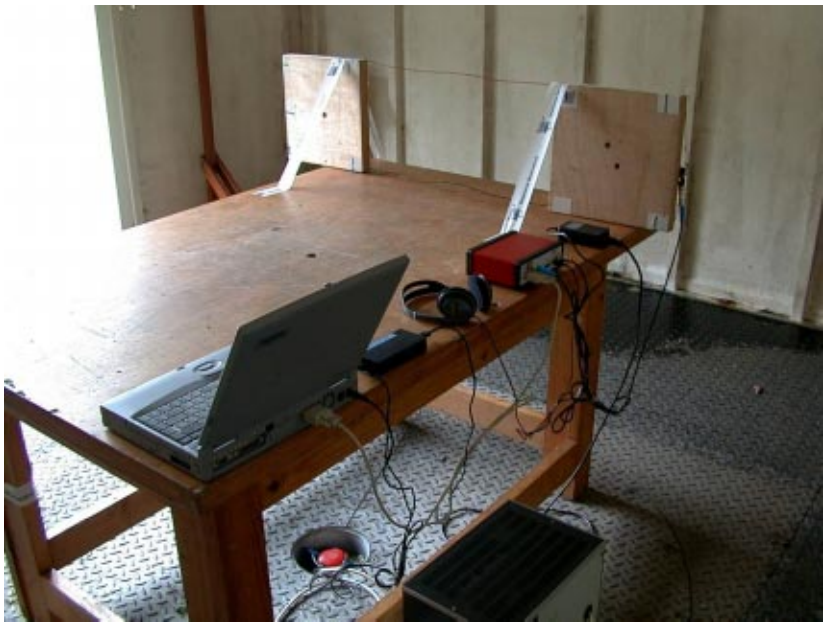
| Brand / Modelnumber | Description | Inter connecting cables |
|---|---|---|
| AMBrc Decoder<br>FCC ID: NXYAMBGP4 | 5.0 MHz Decoder receiver | -1.5m unshielded cable to power adapter<br>-2.0m shielded cable to headphone<br>-2.0m shielded aux cable to suitable termination<br>-2.0m shielded USB cable to suitable termination<br>-1.5m shielded RS232 serial cable to laptop PC<br>-1.5m coax cable for antenna |
| Toshiba 230CX | Laptop PC | -1.5m shielded RS232 cable to decoder receiver<br>-1.5m unshielded cable to power adapter |
| SWI15-12-B1 | 12v power adapter | -1.5m unshielded cable to decoder receiver |
| Sony | headphone | -2.0m shielded cable to decoder receiver |

# 4 Conducted and radiated measurement photos.

On pages 8 to 11 the conducted and radiated emission measurements photos are given:

Page 8: AMBrc decoder (radiated emission, front)

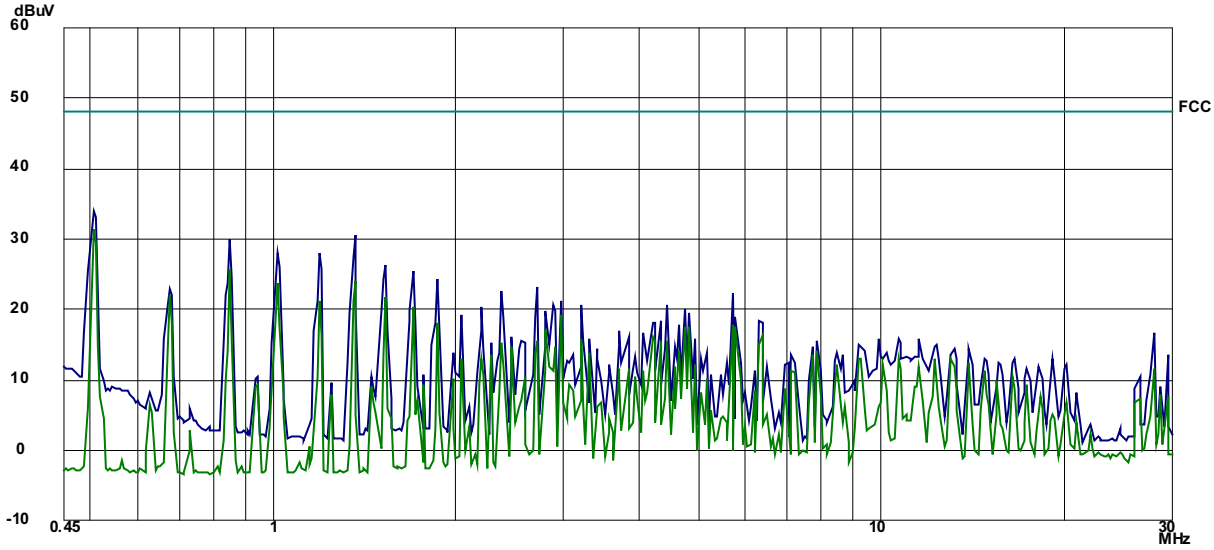
Page 9: AMBrc decoder (radiated emission, back)



Page 10: AMBrc decoder (conducted emission, front)

Page 11: AMBrc decoder (conducted emission, back)

# 5 Conducted emission data.




L1: blue trace is QP, green trace is AVG

| Frequency (MHz) | Measurement results dB(µV) L1 QP | Limits dB(µV) section 207 QP | Result |
|---|---|---|---|
| 0.505 | 34.1 | 48.0 | PASS |
| 0.675 | 23.0 | 48.0 | PASS |
| 0.850 | 30.0 | 48.0 | PASS |
| 1.020 | 28.0 | 48.0 | PASS |
| 1.190 | 28.0 | 48.0 | PASS |
| 1.360 | 30.6 | 48.0 | PASS |
| 1.530 | 26.4 | 48.0 | PASS |
| 1.695 | 25.6 | 48.0 | PASS |
| 1.870 | 24.2 | 48.0 | PASS |
| 2.370 | 22.7 | 48.0 | PASS |
| 2.715 | 23.1 | 48.0 | PASS |

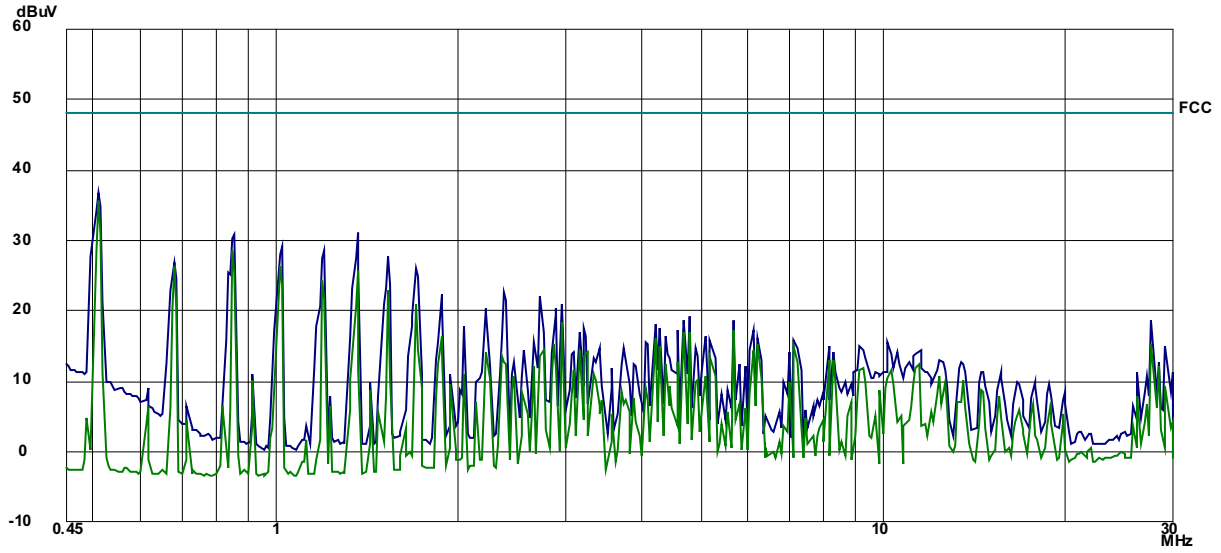
QP = Quasi-peak
Measured levels on frequencies not stated in this report have been measured more than 20 dB below the applicable limit.

Table 1

The results of the disturbance voltage level measurements at the AC mains connection terminal **L1** of the receiver/decoder, brand AMB, type AMBrc decoder, carried out in accordance with FCC Part 15, section 107 and ANSI C63.4-1992, are depicted in table 1. Measurement results are quasi-peak results.

Test engineer : O. H. Hoekstra Date: June 8, 2000

Tester signature :




L2: blue trace is QP, green trace is AVG

| Frequency (MHz) | Measurement results dB(µV) L2 QP | Limits dB(µV) section 207 QP | Result |
|---|---|---|---|
| 0.505 | 36.8 | 48.0 | PASS |
| 0.675 | 27.0 | 48.0 | PASS |
| 0.850 | 30.3 | 48.0 | PASS |
| 1.020 | 28.1 | 48.0 | PASS |
| 1.190 | 28.6 | 48.0 | PASS |
| 1.360 | 31.1 | 48.0 | PASS |
| 1.530 | 27.9 | 48.0 | PASS |
| 1.695 | 26.0 | 48.0 | PASS |
| 1.870 | 22.3 | 48.0 | PASS |
| 2.370 | 22.7 | 48.0 | PASS |
| 2.715 | 22.3 | 48.0 | PASS |

QP = Quasi-peak
Measured levels on frequencies not stated in this report have been measured more than 20 dB below the applicable limit.

Table 1a

The results of the disturbance voltage level measurements at the AC mains connection terminal **L2** of the receiver/decoder, brand AMB, type AMBrc decoder, carried out in accordance with FCC Part 15, section 107 and ANSI C63.4-1992, are depicted in table 1a. Measurement results are quasi-peak results.

Test engineer : O. H. Hoekstra Date: June 8, 2000

Tester signature :

# 6 Radiated emission data.

## 6.1 Radiated field strength measurement (30 MHz - 1000 MHz, E-field).

| Frequency (MHz) | Measurement results dB(µV)/m 3 metres QP | | Limits dB(µV)/m @ 3 metres QP |
|---|---|---|---|
| | Vertical | Horizontal | section 209 |
| 30.0 – 54.3 | < 20.0 | < 20.0 | 40,0 |
| 54.3 | 22.6 | 18.3 | 40,0 |
| 54.3 – 72.2 | < 20.0 | < 20.0 | 40,0 |
| 72.2 | 23.2 | 25.3 | 40,0 |
| 72.2-88.0 | <20.0 | < 20.0 | 40.5 |
| 88.0-216.0 | <20.0 | < 20.0 | 43,5 |
| 216.0 - 425.0 | < 20.0 | < 20.0 | 46.0 |
| 425.0 - 630.0 | < 25.0 | < 25.0 | 46.0 |
| 630.0 - 960.0 | < 30.0 | < 30.0 | 46.0 |
| 960.0 - 1000.0 | < 31.0 | < 31.0 | 54.0 |

QP = Quasi-peak
Measured levels on frequencies not stated in this report have been measured more than 20 dB below the applicable limit.

Table 2

Results of the radiated field strength (E-field) measurements on the receiver/decoder, brand AMB, type AMBrc decoder, carried out in accordance with FCC Part 15, section 109 and ANSI C63.4-1992 in the configuration and operation mode(s) as stated in this testreport, are depicted in table 2. Measurement results are quasi-peak results.

Test engineer : O. H. Hoekstra Date: June 8, 2000

Tester signature :

# 7 Photos of tested EUT.

Photo's of exterior and interior are included in separate annex.