NASACO ELECTRONICS TEST REPORT

FOR THE

PORTABLE BASE UNIT, MAB9030

FCC PART 15 SUBPART B CLASS B
&
FCC PART 15 SUBPART C SECTION 15.223

COMPLIANCE

DATE OF ISSUE: AUGUST 21, 2000

PREPARED FOR:

Nasaco Electronics
11F, Unit 6, Eastern Centre
1065 King's Road
Quarry Bay, Hong Kong

W.O. No: 74898

Report No: FC00-080

PREPARED BY:

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Date of test: August 2-9, 2000

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	August 2-9, 2000
PURPOSE OF TEST:	To demonstrate the compliance of the Portable Base Unit, MAB9030, with the requirements for FCC Part 15 Subpart B Class B and FCC Part 15 Subpart C Section 15.223 devices.
MANUFACTURER:	Nasaco Electronics 11/F, Unit 6, Eastern Centre 1065 King's Road, Quarry Bay, Hong Kong
REPRESENTATIVE:	Y.K. So
TEST LOCATION:	CKC Laboratories, Inc. 22105 Wilson River Hwy, Tillamook, OR 97141 5289 NE Elam Young Pkwy, Hillsboro, OR 97124
TEST PERSONNEL:	Mike Wilkinson & Kevin Daniel
TEST METHOD:	ANSI C63.4 1992
FREQUENCY RANGE TESTED:	9kHz - 1000 MHz
EQUIPMENT UNDER TEST:	**Portable Base Unit** Manuf: Nasaco Electronics Model: MAB9030 Serial: N/A FCC ID: LLP-9030 (pending)

SUMMARY OF RESULTS

The Nasaco Electronics Portable Base Unit, MAB9030, was tested in accordance with ANSI C63.4 1992 for compliance with FCC Part 15 Subpart B Class B and FCC Part 15 Subpart C Section 15.223 devices.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15 Subpart B Class B and FCC Part 15 Subpart C Section 15.223. The results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Wireless hands-free-portable base unit.

MEASUREMENT UNCERTAINTY

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

EUT OPERATING FREQUENCY

The EUT was operating at 1.762-1.784 MHz.

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

PERIPHERAL DEVICES

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

Wireless Magnetic Headset
Manuf: Nasaco Electronics
Model: MAH9011
Serial: N/A
FCC ID: LLP-9011 (pending)

Function Generator
Manuf: BK
Model: 4011
Serial: 259-05324
FCC ID: N/A

REPORT OF MEASUREMENTS

The following tables report the highest worst case levels recorded during the tests performed on the Portable Base Unit, MAB9030. All readings taken are peak readings unless otherwise noted by a "Q" or "A". The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Transmitter Fundamental Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Mag dB	CORRECTION FACTORS Cable dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
1.760	49.0	10.6	0.2	59.8	63.5	-3.7	N - Back
1.760	47.2	10.6	0.2	58.0	63.5	-5.5	N - Back
1.761	45.6	10.6	0.2	56.4	63.5	-7.1	N - Side
1.762	48.9	10.6	0.2	59.7	63.5	-3.8	N - Back
1.765	41.6	10.6	0.2	52.4	63.5	-11.1	N - Vertical
1.768	41.8	10.6	0.2	52.6	63.5	-10.9	NA - Back

Test Method: ANSI C63.4 1992
Spec Limit : FCC Section 15.223
Test Distance: 3 Meters

NOTES: N = No Polarization & Orientation

COMMENTS: The fundamental Power Out limit of 15 uV/m @ 30 meters is used as it is higher than the measured Bandwidth (14.7 kHz)/(1.763 MHz) center frequency = 8.34 uV/m @ 30 meters. EUT was tested in 3 orthogonal planes as noted for each reading. EUT interconnect cable has +1.5 VDC applied to pin 1 and ground applied to pin 3 from a AAA battery and 4 inch wires. This allows the EUT to transmit continuously. EUT interconnect cable has a 1.0 kHz @ 120 mV RMS signal from the function generator applied to pin 2, this is the maximum modulation level allowed. A headset is on the test table and turned on. This stabilizes the EUT antenna selection. The EUT is battery operated. The temperature was 72°F and the humidity was 49 %. EUT is set to channel 1. Modulation level was varied from 60 to 180 mV RMS @ 1.0 kHz and the transmitter output did not exceed worst case. Reference readings 5 & 6.

Base Unit Data Conversions

Measurement Units conversion for Nasaco W/O 74898 Base Unit file# FCPO01A-BASE															
Frequency (MHz)	E-Field Measured dBuVm	FCC Limit dBuV/m	Margin dB	H-Field Measured dBuA/m	FCC Limit dBuA/m	Margin dB	Corrected E V/m	ERP mW	ERP dBmW	Spec. V/m	Spec. mW/m	ERP Limit dBmW	Margin dB	Ortho-gonal Plane	Result	Notes
1.760	59.8	63.5	-3.7	8.300	12.000	-3.700	9.772E-04	1.746 9E-04	-37.577 2259	1.496 E-03	4.095 E-04	-33.877 22593	-3.7	Back	PASS	
1.760	58	63.5	-5.5	6.500	12.000	-5.500	7.943E-04	1.154 2E-04	-39.377 2259	1.496 E-03	4.095 E-04	-33.877 22593	-5.5	Back	PASS	
1.761	56.4	63.5	-7.1	4.900	12.000	-7.100	6.607E-04	7.985 0E-05	-40.977 2259	1.496 E-03	4.095 E-04	-33.877 22593	-7.1	Vertical	PASS	
1.762	59.7	63.5	-3.8	8.200	12.000	-3.800	9.661E-04	1.707 2E-04	-37.677 2259	1.496 E-03	4.095 E-04	-33.877 22593	-3.8	Side	PASS	
1.765	52.4	63.5	-11.1	0.900	12.000	-11.100	4.169E-04	3.178 9E-05	-44.977 2259	1.496 E-03	4.095 E-04	-33.877 22593	-11.1	Back	PASS	Mod level= 60 mV RMS
1.768	52.6	63.5	-10.9	1.100	12.000	-10.900	4.266E-04	3.328 7E-05	-44.777 2259	1.496 E-03	4.095 E-04	-33.877 22593	-10.9	Back	PASS	Mod level= 180 mV RMS

Explanation of Calculations :

E-Field (dBuV/m) : Measured E-Field with antenna including all correction factors for cable loss and antenna used.
FCC Limit (dBuV/m) : Calculated from formula 47 CFR FCC Part 15, Paragraph TBD
H-Field (dBuA/m) = E-Field (dBuV/m) - 20*log(377)
Margin (dB) = Limit (dBuV/m) - E-Field Measured (dBuV/m)
ERP (mW) = (E*d)^2/(30*G) where E is E-Field in V/m, d is test distance (3 meters), and G is gain of half wave dipole (G=1.64)
ERP (dBmW) = 10*log[ERP(mW)]

Table 2: Transmitter Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Log dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
31.749	38.8	16.2	-27.9	1.0		28.1	40.0	-11.9	V-Back
33.475	36.2	15.6	-27.9	0.9		24.8	40.0	-15.2	V-Side
35.271	36.5	15.0	-27.9	0.9		24.5	40.0	-15.5	V-Back
36.993	36.2	14.4	-27.9	0.9		23.6	40.0	-16.4	V-Back
38.761	35.9	13.9	-27.9	0.9		22.8	40.0	-17.2	V-Back
44.067	40.3	11.4	-27.9	1.1		24.9	40.0	-15.1	V-Back

Test Method: ANSI C63.4 1992
Spec Limit : FCC Section 15.209
Test Distance: 3 Meters

NOTES: V = Vertical Polarization & Orientation

COMMENTS: EUT was tested in 3 orthogonal planes as noted for each reading. EUT interconnect cable has +1.5 VDC applied to pin 1 and ground applied to pin 3 from a AAA battery and 4 inch wires. This sets the EUT to transmit continuously. EUT interconnect cable has a 1.0 kHz @ 120 mV RMS signal from the function generator applied to pin 2, this is the maximum modulation level allowed. A headset is on the test table and turned on. This stabilizes the EUT antenna selection. The EUT is battery operated. The temperature was 72°F and the humidity was 49 %. EUT is set to channel 1. Frequency range investigated was 9.0 kHz to 1.0 GHz.

Table 3: Receiver Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Bilog dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
31.749	38.8	16.2	-27.9	1.0		28.1	40.0	-11.9	V
33.511	35.8	15.6	-27.9	0.9		24.4	40.0	-15.6	V
35.271	36.5	15.0	-27.9	0.9		24.5	40.0	-15.5	V
36.993	36.2	14.4	-27.9	0.9		23.6	40.0	-16.4	V
44.067	40.3	11.4	-27.9	1.1		24.9	40.0	-15.1	V
46.107	45.3	10.3	-27.9	1.1		28.8	40.0	-11.2	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Section 15.109
Test Distance: 3 Meters

NOTES: V = Vertical Polarization

COMMENTS: EUT was tested in the back orthogonal plane. EUT operates in Full Duplex Link mode (receives and transmits at the same time). Modulation and bias must be present to maintain EUT operation during the receiver test. EUT interconnect cable has +1.5 VDC applied to pin 1 and ground applied to pin 3 from a AAA battery and 4 inch wires. This sets the EUT to transmit continuously. EUT interconnect cable has a 1.0 kHz @ 120 mV RMS signal from the function generator applied to pin 2, this is the maximum modulation level allowed. A headset is on the test table and turned on. This stabilizes the EUT antenna selection. The EUT is battery operated. The temperature was 72°F and the humidity was 49 %. EUT is set to channel 1. Frequency range investigated was 30.0 MHz to 1.0 GHz.

TABLE A

LIST OF TEST EQUIPMENT

Tillamook site C & Hillsboro Lab

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 85650A	2043A00433	04/21/2000	04/21/2001	29
HP 8568A	2235A02426	04/21/2000	04/21/2001	202
HP 54615B	US3703447	11/29/1999	11/29/2000	2313
EMCO 6502	2156	01/26/2000	01/26/2001	52
HP 8447D	2727A05432	06/01/2000	06/01/2001	282
Chase CBL6111C	2456	08/30/1999	08/30/2000	1991

EUT SETUP

The equipment under test (EUT) and the peripheral(s) listed were set up in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 for transmitter fundamental radiated emissions, Table 2 for transmitter radiated emissions, and Table 3 for receiver radiated emissions. Additionally, a complete description of all the ports is included on the information sheets contained in Appendix A.

During radiated emissions testing, 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. This configuration is typical for radiated emissions testing of table top devices.

I/O cables were connected to the EUT and peripherals in the manner required for normal operation of the system.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect the radiated emissions data for the Portable Base Unit, MAB9030. For frequencies below 30 MHz the magnetic loop antenna was used. For radiated measurements from 30 to 1000 MHz, the biconilog antenna was used. All antennas were located at a distance of 3 meters from the edge of the EUT.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. 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.

TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	9kHz	150 kHz	200Hz
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 Tables 1-3 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 Portable Base Unit, MAB9030.

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.

TEST METHODS

The radiated emissions data of the Portable Base Unit, MAB9030, 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 the "Sample Calculations". For the receiver portion of testing the corrected data was then compared to the FCC Part 15 Subpart B Class B. For the transmitter portion of testing the corrected data was then compared to the FCC Part 15 Subpart C Section 15.223 emissions limits to determine compliance.

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

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined test mode, with the I/O cables and line cords facing the antenna. For frequencies below 30 MHz the magnetic loop antenna was used. The frequency range of 30 MHz - 1000 MHz was then scanned with the biconilog antenna located about 1.5 meter above the ground plane in the vertical polarity. During this scan, the turntable was rotated and all peaks, which were at or near the limit, were recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconilog antenna was changed to the horizontal polarity and the above steps were repeated. 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.

For the final radiated scan, the equipment was again positioned facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation, antenna height and configuration of the peripherals. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

FCC Section 15.223(a) - Occupied Bandwidth Measurements

In accordance with Section 15.223(a), bandwidth was determined at the points 6 dB down from the modulated carrier.

SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the emissions readings in Tables 1-3. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula:

Meter reading (dBµV)
+ Antenna Factor (dB)
+ Cable Loss (dB)
- Distance Correction (dB)
- Pre-amplifier Gain (dB)

= Corrected Reading (dBµV/m)

This reading was then compared to the applicable specification limit to determine compliance.

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

#	Freq MHz	Rdng dBuV	Cable	Amp	Bilog	Dist	Corr dBuV/m	Spec	Margin	Polar	Mag

means reading number
Freq MHz is the frequency in MHz of the obtained reading.
Rdng dBuV is the reading obtained on the spectrum analyzer in dBµV.
Amp is short for the preamplifier factor or gain in dB.
Bilog is the biconilog antenna factor in dB.
Mag 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). It is used when testing at a different test distance than the one stated in the spec.
Corr dBµV/m is the corrected reading which is now in dBµV/m (field strength).
Spec is the specification limit (dB) stated in the 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.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	NOT APPLICABLE
CRT was displaying:	NOT APPLICABLE
Power Supply Manufacturer:	NOT APPLICABLE
Power Supply Part Number:	NOT APPLICABLE
AC Line Filter Manufacturer:	NOT APPLICABLE
AC Line Filter Part Number:	NOT APPLICABLE
Line voltage used during testing:	NOT APPLICABLE

I/O PORTS	
Type	#
2.5mm Stereo plug	1

CRYSTAL OSCILLATORS	
Type	Freq In MHz
Cylindrical	32.768kHz

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Main Board	MAB9030	-	4	Inside Base Unit

REQUIRED EUT CHANGES TO COMPLY:
None.

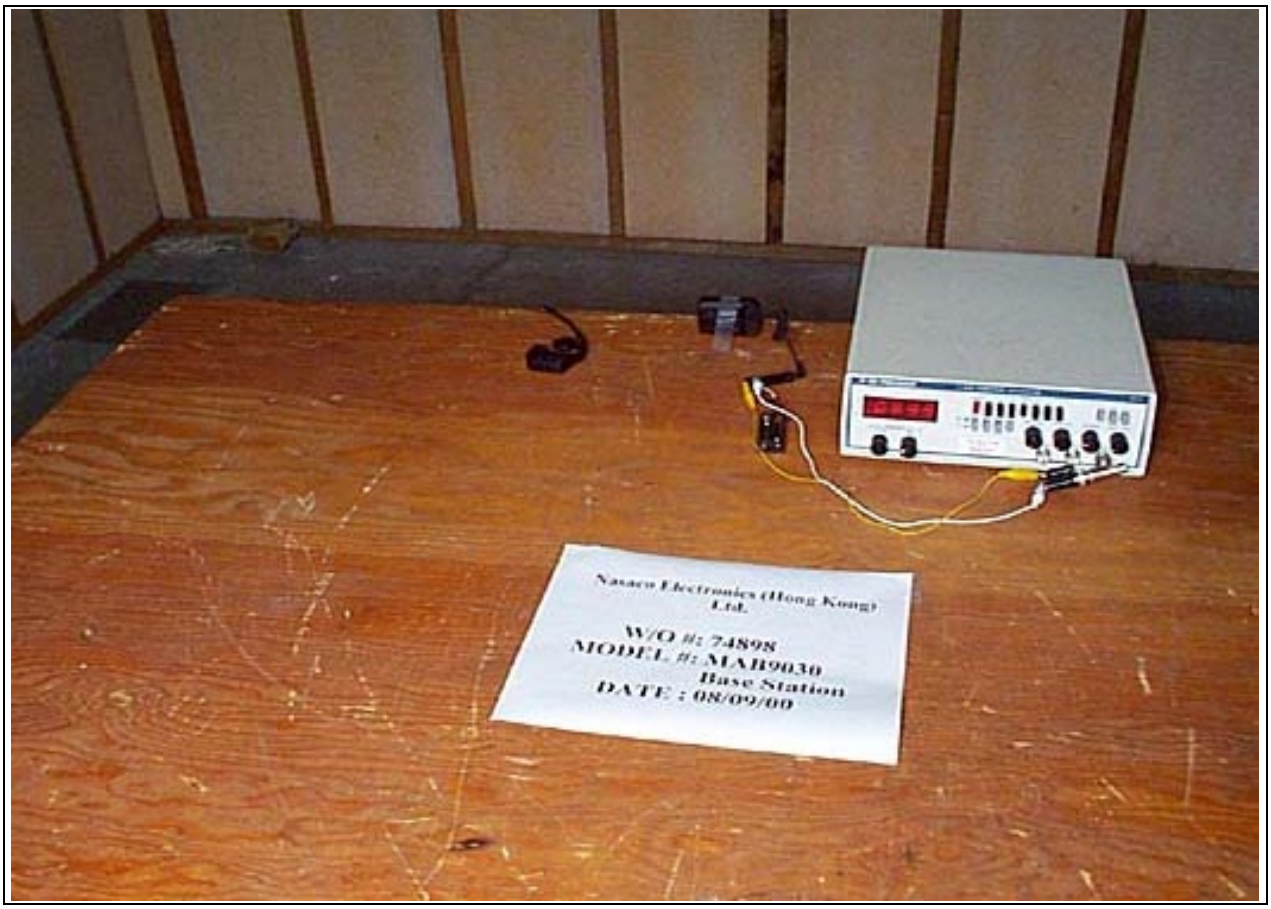
PHOTOGRAPH SHOWING RADIATED EMISSIONS

Transceiver Radiated Emissions - Front View, Back Orientation

PHOTOGRAPH SHOWING RADIATED EMISSIONS

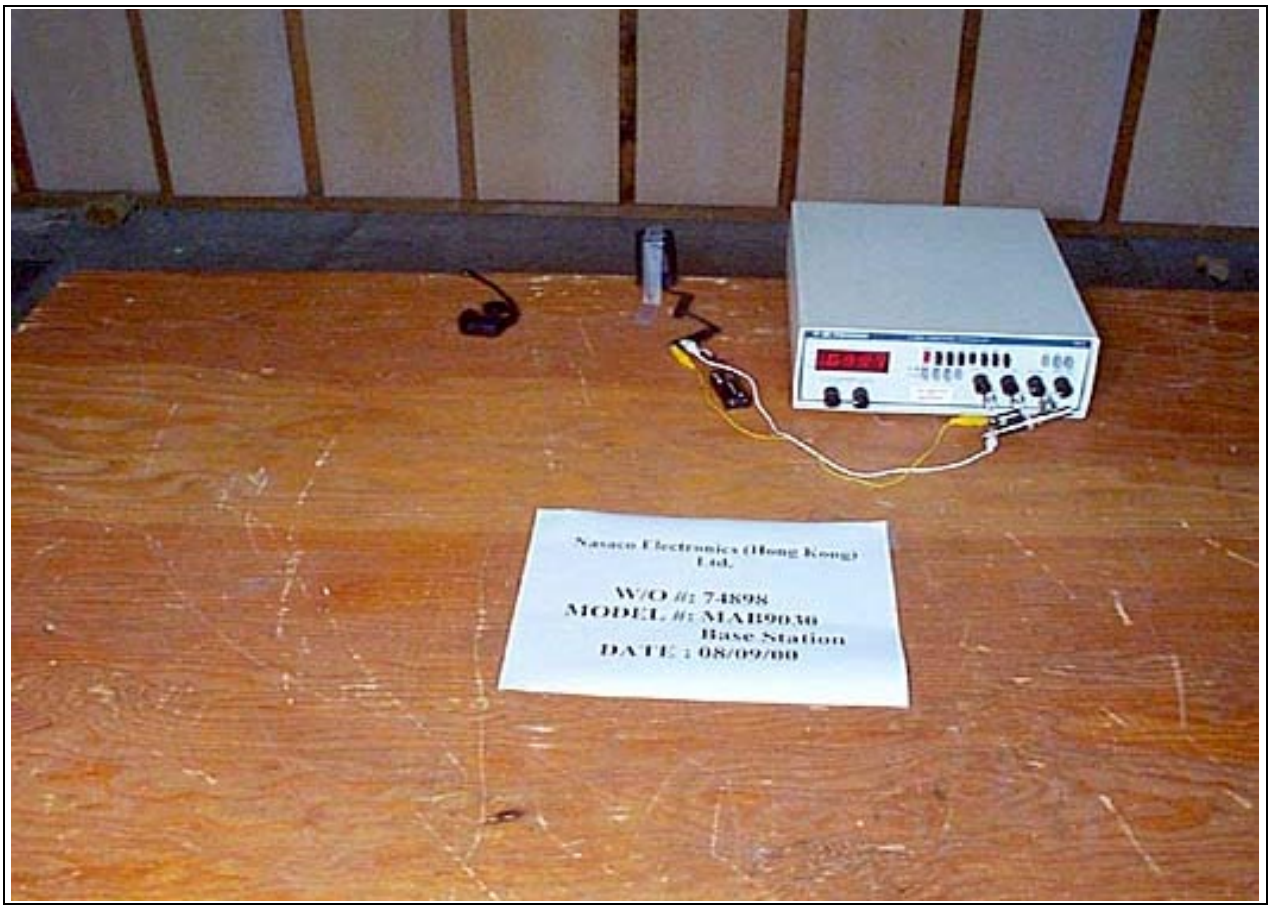
Transceiver Radiated Emissions - Back View, Back Orientation

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Transceiver Radiated Emissions - Front View, Side Orientation

PHOTOGRAPH SHOWING RADIATED EMISSIONS

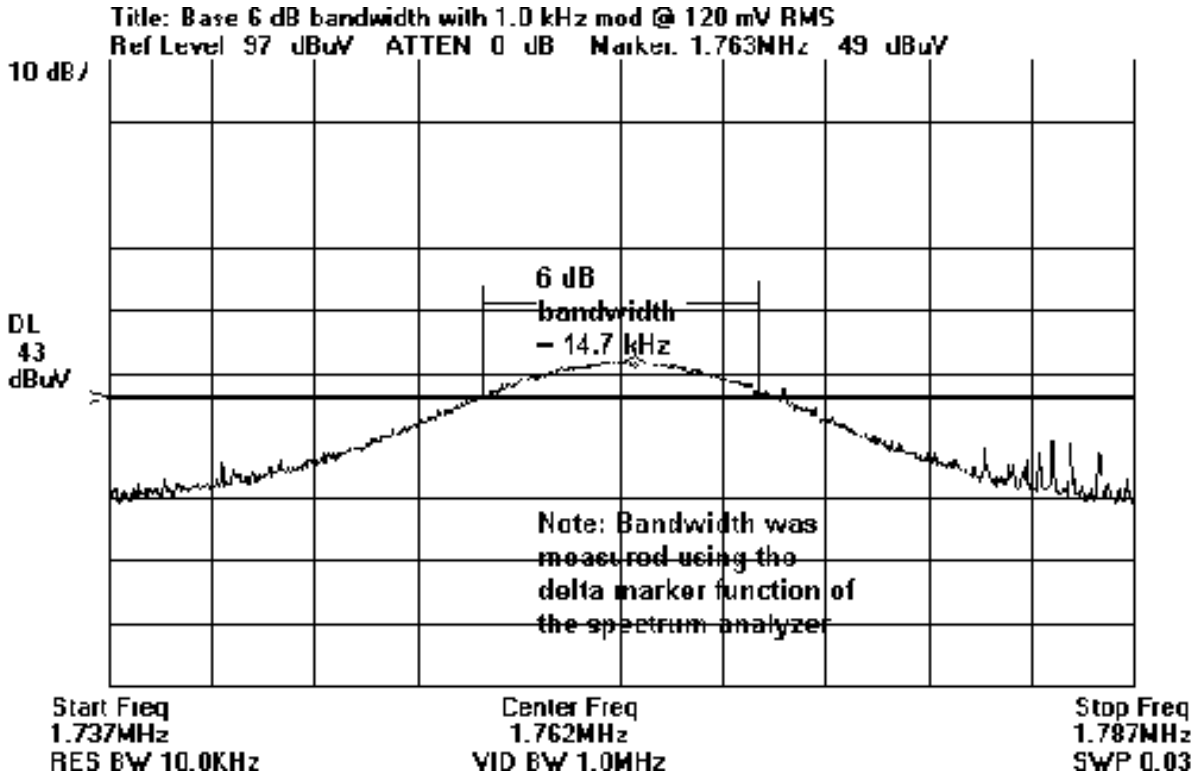


Transceiver Radiated Emissions - Front View, Vertical Orientation

APPENDIX B

MEASUREMENT DATA SHEETS

Occupied Bandwidth Plot



Test Location: CKC Laboratories. Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **Nasaco Electronics**
Specification: **FCC15.223 – TRANSMITTER PORTION**
Work Order #: **74898** Date: 08/09/2000
Test Type: **Radiated Scan** Time: 10:06:16
Equipment: **Base Station** Sequence#: 1
Manufacturer: Nasaco Electronics Tested By: Mike Wilkinson
Model: MAB9030
S/N: N/A

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

Function	Manufacturer	Model #	S/N
Base Station*	Nasaco Electronics	MAB9030	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Headset	Nasaco Electronics	MAH9011	N/A
Function Generator	BK	4011	259-05324

Test Conditions / Notes:

COMMENTS: The fundamental Power Out limit of 15 uV/m @ 30 meters is used as it is higher than the measured Bandwidth (14.7 kHz)/(1.763 MHz) center frequency = 8.34 uV/m @ 30 meters. EUT was tested in 3 orthogonal planes as noted for each reading. EUT interconnect cable has +1.5 VDC applied to pin 1 and ground applied to pin 3 from a AAA battery and 4 inch wires. This allows the EUT to transmit continuously. EUT interconnect cable has a 1.0 kHz @ 120 mV RMS signal from the function generator applied to pin 2, this is the maximum modulation level allowed. A headset is on the test table and turned on. This stabilizes the EUT antenna selection. The EUT is battery operated. The temperature was 72°F and the humidity was 49 %. EUT is set to channel 1. Modulation level was varied from 60 to 180 mV RMS @ 1.0 kHz and the transmitter output did not exceed worst case. Reference readings 5 & 6.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Cable dB	Mag dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1 Ave	1.768M	41.8	+0.2	+10.6			+0.0	52.6	63.5 Orthogonal = Back	-10.9	None
^	1.760M	49.0	+0.2	+10.6			+0.0	59.8	63.5 Orthogonal = Back	-3.7	None
^	1.762M	48.9	+0.2	+10.6			+0.0	59.7	63.5 Orthogonal = Back. Mod Level = 60 mV RMS	-3.8	None
^	1.760M	47.2	+0.2	+10.6			+0.0	58.0	63.5 Orthogonal = Back. Mod level = 180 mV RMS	-5.5	None
^	1.761M	45.6	+0.2	+10.6			+0.0	56.4	63.5 Orthogonal = Side	-7.1	None
^	1.765M	41.6	+0.2	+10.6			+0.0	52.4	63.5 Orthogonal = Vertical	-11.1	None

Test Location: CKC Laboratories. Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **Nasaco Electronics**
Specification: **FCC15.209 – TRANSMITTER PORTION**
Work Order #: **74898** Date: 08/09/2000
Test Type: **Radiated Scan** Time: 12:54:49
Equipment: **Base Station** Sequence#: 2
Manufacturer: Nasaco Electronics Tested By: Mike Wilkinson
Model: MAB9030
S/N: N/A

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

Function	Manufacturer	Model #	S/N
Base Station*	Nasaco Electronics	MAB9030	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Headset	Nasaco Electronics	MAH9011	N/A
Function Generator	BK	4011	259-05324

Test Conditions / Notes:

COMMENTS: EUT was tested in 3 orthogonal planes as noted for each reading. EUT interconnect cable has +1.5 VDC applied to pin 1 and ground applied to pin 3 from a AAA battery and 4 inch wires. This sets the EUT to transmit continuously. EUT interconnect cable has a 1.0 kHz @ 120 mV RMS signal from the function generator applied to pin 2, this is the maximum modulation level allowed. A headset is on the test table and turned on. This stabilizes the EUT antenna selection. The EUT is battery operated. The temperature was 72°F and the humidity was 49 %. EUT is set to channel 1. Frequency range investigated was 9.0 kHz to 1.0 GHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Cable Amp dB	Mag dB	Bilog dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	31.749M	38.8	+0.0 -27.9	+0.0	+16.2	+1.0	+0.0	28.1	40.0 Orthogonal = Back	-11.9	Vert
2	31.666M	36.4	+0.0 -27.9	+0.0	+16.2	+1.0	+0.0	25.7	40.0 Orthogonal = Side	-14.3	Vert
3	44.067M	40.3	+0.0 -27.9	+0.0	+11.4	+1.1	+0.0	24.9	40.0 Orthogonal = Back	-15.1	Vert
4	33.475M	36.2	+0.0 -27.9	+0.0	+15.6	+0.9	+0.0	24.8	40.0 Orthogonal = Side	-15.2	Vert
5	35.271M	36.5	+0.0 -27.9	+0.0	+15.0	+0.9	+0.0	24.5	40.0 Orthogonal = Back	-15.5	Vert
6	33.511M	35.8	+0.0 -27.9	+0.0	+15.6	+0.9	+0.0	24.4	40.0 Orthogonal = Back	-15.6	Vert
7	31.703M	34.9	+0.0 -27.9	+0.0	+16.2	+1.0	+0.0	24.2	40.0 Orthogonal = Vertical	-15.8	Vert
8	35.281M	35.6	+0.0 -27.9	+0.0	+15.0	+0.9	+0.0	23.6	40.0 Orthogonal = Side	-16.4	Vert
9	36.993M	36.2	+0.0 -27.9	+0.0	+14.4	+0.9	+0.0	23.6	40.0 Orthogonal = Back	-16.4	Vert
10	33.471M	34.6	+0.0 -27.9	+0.0	+15.6	+0.9	+0.0	23.2	40.0 Orthogonal = Vertical	-16.8	Vert

11	37.016M	35.4	+0.0 -27.9	+0.0	+14.4	+0.9	+0.0	22.8	40.0 Orthogonal = Vertical	-17.2	Vert
12	40.543M	36.6	+0.0 -27.9	+0.0	+13.2	+0.9	+0.0	22.8	40.0 Orthogonal = Back	-17.2	Vert
13	38.761M	35.9	+0.0 -27.9	+0.0	+13.9	+0.9	+0.0	22.8	40.0 Orthogonal = Back	-17.2	Vert
14	37.008M	35.0	+0.0 -27.9	+0.0	+14.4	+0.9	+0.0	22.4	40.0 Orthogonal = Side	-17.6	Vert
15	35.079M	23.7	+0.0 -27.9	+0.0	+15.1	+0.9	+0.0	11.8	40.0 Orthogonal = Back	-28.2	Horiz
16	5.286M	28.1	+0.2 +0.0	+10.5	+0.0	+0.0	+0.0	38.8	70.0 Orthogonal = Back	-31.2	None
17	28.183M	28.7	+0.5 +0.0	+9.0	+0.0	+0.0	+0.0	38.2	70.0 Orthogonal = Back	-31.8	None
18	22.911M	27.3	+0.4 +0.0	+10.0	+0.0	+0.0	+0.0	37.7	70.0 Orthogonal = Back	-32.3	None
19	24.674M	27.2	+0.4 +0.0	+9.7	+0.0	+0.0	+0.0	37.3	70.0 Orthogonal = Back	-32.7	None

Test Location: CKC Laboratories. Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **Nasaco Electronics**
Specification: **FCC 15.109 – RECEIVER PORTION**
Work Order #: **74898** Date: 08/09/2000
Test Type: **Radiated Scan** Time: 14:54:01
Equipment: **Base Station** Sequence#: 3
Manufacturer: Nasaco Electronics Tested By: Mike Wilkinson
Model: MAB9030
S/N: N/A

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

Function	Manufacturer	Model #	S/N
Base Station*	Nasaco Electronics	MAB9030	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Headset	Nasaco Electronics	MAH9011	N/A
Function Generator	BK	4011	259-05324

Test Conditions / Notes:

COMMENTS: EUT was tested in the back orthogonal plane. EUT operates in Full Duplex Link mode (receives and transmits at the same time). Modulation and bias must be present to maintain EUT operation during the receiver test. EUT interconnect cable has +1.5 VDC applied to pin 1 and ground applied to pin 3 from a AAA battery and 4 inch wires. This sets the EUT to transmit continuously. EUT interconnect cable has a 1.0 kHz @ 120 mV RMS signal from the function generator applied to pin 2, this is the maximum modulation level allowed. A headset is on the test table and turned on. This stabilizes the EUT antenna selection. The EUT is battery operated. The temperature was 72°F and the humidity was 49 %. EUT is set to channel 1. Frequency range investigated was 30.0 MHz to 1.0 GHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Bilog dB	Cable dB	Amp dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	46.107M	45.3	+10.3	+1.1	-27.9		+0.0	28.8	40.0	-11.2	Vert
2	31.749M	38.8	+16.2	+1.0	-27.9		+0.0	28.1	40.0	-11.9	Vert
3	44.067M	40.3	+11.4	+1.1	-27.9		+0.0	24.9	40.0	-15.1	Vert
4	35.271M	36.5	+15.0	+0.9	-27.9		+0.0	24.5	40.0	-15.5	Vert
5	33.511M	35.8	+15.6	+0.9	-27.9		+0.0	24.4	40.0	-15.6	Vert
6	36.993M	36.2	+14.4	+0.9	-27.9		+0.0	23.6	40.0	-16.4	Vert

7	40.543M	36.6	+13.2	+0.9	-27.9	+0.0	22.8	40.0	-17.2	Vert
8	38.761M	35.9	+13.9	+0.9	-27.9	+0.0	22.8	40.0	-17.2	Vert
9	40.940M	35.1	+13.0	+0.9	-27.9	+0.0	21.1	40.0	-18.9	Vert
10	35.079M	23.7	+15.1	+0.9	-27.9	+0.0	11.8	40.0	-28.2	Horiz