

NextNav Local User NOC Manual

MRS-NN-EN-OP-1099.02

FCC ID: A4P-200-0013-01



NextNav Confidential and Proprietary

Restricted Distribution. Not to be distributed to anyone who is not an employee of either NextNav or a subsidiary of NextNav without the express approval of NextNav Document Control.

All data and information contained in or disclosed by this document is confidential and proprietary information of NextNav, LLC and all rights therein are expressly reserved. By accepting this material, the recipient agrees that this material and the information contained therein is to be held in confidence and in trust and will not be disseminated, distributed, copied, reproduced in whole or in part, nor its contents revealed in any manner to others without the express written permission of NextNav LLC.

History

Version	Date	Author	Notes
0.1	May 16, 2013	D. Gautam, W. Kunysz	1
0.2	May 24, 2013	W. Kunysz	2

Notes:

1. Initial Version
2. FCC warning statement

Table of Contents

History	2
Notes:	2
1 Introduction	4
1.1 Purpose and Scope.....	4
1.2 Intended Use.....	4
1.3 FCC Compliance Statements	4
2 NextNav Local Beacon Commissioning	5
2.1 Equipment List	5
2.2 Confirm External Cable Connections.....	6
3 Antenna Mounting	8
3.1 TX Antenna.....	8
3.2 Tune-up procedure not to exceed maximum TX power.....	9
3.3 GPS Receive Antenna.....	9

Table of Figures

Figure 1 – MARS Box Front Panel.....	6
Figure 2 – MARS Box Rear Panel	7

1 Introduction

1.1 Purpose and Scope

This document describes the commissioning and normal usage procedure for the NextNav Local beacon box (A4P-200-0013-01).

1.2 Intended Use

The NextNav Local beacon system is intended to be used in restricted access locations (RAL) in indoor environments. The NextNav Local beacon is powered by a DC power system approved for use in telecommunications equipment.

1.3 FCC Compliance Statements

FCC Section 15.21 Information to user.

Any changes or modifications to the equipment operation settings must be approved by the NextNav, LLC for FCC compliance; otherwise the user's authority to operate the equipment will be voided.

Section 15.105(b) Class A digital device Information to the user

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the antenna and any body part of the user or nearby persons.

2 NextNav Local Beacon Commissioning

Once the NextNav Local Box is installed in the field and the installation checklist is verified, a field technician follows the following sequence of operations to power up the box as illustrated in **Error! Reference source not found.** and the following checklist can be used for verification of completion of the steps needed.

	Installation Tech checklist	
1	GPS antenna connection	Yes <input type="checkbox"/> No <input type="checkbox"/>
2	Tx antenna connection	Yes <input type="checkbox"/> No <input type="checkbox"/>
3	EvDO antenna connection	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
4	SBC: Ethernet port activity	Yes <input type="checkbox"/> No <input type="checkbox"/>
5	Rb: Rear Panel LED indicator is lit	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
6	MAIA4: Rear Panel LED indicator is lit	Yes <input type="checkbox"/> No <input type="checkbox"/>
7	Able to browse internet from field service laptop using Ethernet port on WAPS beacon box	Yes <input type="checkbox"/> No <input type="checkbox"/>
8	Enable port forwarding if not already done at manufacturing site	Yes <input type="checkbox"/> No <input type="checkbox"/>
9	TX antenna LLA survey done	Yes <input type="checkbox"/> No <input type="checkbox"/>
10	Weather board LLA survey done	Yes <input type="checkbox"/> No <input type="checkbox"/>
11	GPS antenna LLA survey done	Yes <input type="checkbox"/> No <input type="checkbox"/>
12	Survey ground truth of the TX antenna, GPS antenna and weatherboard	Yes <input type="checkbox"/> No <input type="checkbox"/>

Table 1 Commissioning Procedure Steps for Installation Technician

2.1 Equipment List

- NextNav Local Beacon
- FCC Approved AC/DC Adapter
- Transmit Antenna (PN: MPA-806-N)
- GPS Antenna (PN: BL1R-A-XTB-1-FKM)
- EVDO Antenna (PN: PSKN-900/1900S)
- NextNav WeatherBoard unit

RF cables as per chart below:

Description	Cable Type	Cable Length (max)
GPS Cable	LMR400	150'
	AL4RPV-50	250'
Tx Cable	LMR400	250'
	AL4RPV-50	400'

2.2 Confirm External Cable Connections



Figure 1 – MARS Box Front Panel

1. Verify the following external connections to the beacon:
 - a) GPS antenna connection to the MARS Box
 - b) Tx antenna cable connection to the 'TX' port.
 - c) Weather box connection to the RJ45 WEATHER port.
 - d) EvDO antenna cables to the EvDO Tx port. In cases of sites which have been documented as requiring EvDO diversity, connect the diversity antenna to the EvDO DIV port. In cases of sites which have been

documented as needing a POTS line, connect the phone line to the 'TELCO' port.

2. Verify that the following LEDs (located at the rear panel) are lit indicating proper operation:
 - a) Rubidium: Power Switch LED and status indicator LED are lit
 - b) MAIA4: Status indicator LED is lit



Figure 2 – MARS Box Rear Panel

3. Connect the field service laptop with an Ethernet cable to the 'Ethernet' port on the MARS beacon box. Wait for a few seconds to get an IP address on the field service laptop. Try and browse the internet to ensure connectivity. Once connectivity is ensured, call the operator at the NOC to further commission the beacon box.

3 Antenna Mounting

3.1 TX Antenna

Tx antenna will be installed indoors. In normal configurations, antenna is to be attached to the ceiling structures. Proper installation procedures must be followed as defined in site specific construction drawing. As a general rule the TX antenna shall be kept a minimum distance of 6 feet from any metallic vertical structures on other types of obstructions.

This radio transmitter (FCC ID: A4P-200-0013-01) has been approved by FCC to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

This radio transmitter may only operate using a vertically polarized antenna with maximum net gain of antenna and cable of +6 dBi. To reduce potential radio interference to other users, the antenna gain should be so chosen that the effective radiated power (ERIP) does not exceed 4 Watts.

Antenna Type: Monopole

Polarization: Vertical

Following is a list of the possible antennas and antenna cables combinations.

Antenna type	Antenna Gain (dBi)	Cable Type	Length (feet)	Cable Loss (dB)	Attenuation Setting (dB)	PA output (Watts)	EIRP (W) (PEP)
MPA-806-N (omni config)	2.5	LMR400	10'	0.4	1.0	0.85	1.38
		AL4RPV-50	10'	0.2	1.0	0.85	1.45
MPA-806-N (90° sector config)	7.0	LMR400	10'	0.4	1.0	0.85	3.89
		AL4RPV-50	10'	0.2	1.5	0.35	3.63

Table 2 – NextNav Local antenna and cable options

Note: PA output level (controlled using internal attenuation setting) refers to internal system parameter. This parameter will be used by the NOC to configure the radio output power.

3.2 Tune-up procedure not to exceed maximum TX power

A CSV file (configuration file) per transmitter are created by the NOC engineer based on the installation parameters such as line lengths, antenna type etc.

The TX output power level setting is contained in the CSV file.

The output power is adjusted by the 'attenuation' setting. This value in the CSV file is calculated by a formula to set the output power (not to exceed 4W EIRP). The variables used in the calculation include PA Gain (G_{pa}), TX Antenna Gain (G_{ant}), TX filter insertion loss (IL_{flt}), internal cable loss (IL_{int}), external cable loss (IL_{ext}), and transceiver output power (P_{TCVR}).

$$EIRP (W) = 10^{((P_{TCVR} - IL_{int} + G_{pa} - IL_{flt} - IL_{ext} + G_{ant}) / 10)} / 1000$$

3.3 GPS Receive Antenna

GPS antenna should be installed such that it has clear view of sky. Ideally, you would keep the antenna close to the ground away from obstruction

- Keep any horizontal blockage smaller than 10 degrees
- Obstruction Clearance guideline
 - If it is 1 ft wide it should be at least 6 ft away
 - If it is 10 ft wide, it should be at least 60 ft. away.
 - If it is significantly less than 1 ft wide (like a guy wire, or a post) it should not cause any measurable effect