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# USER MANUAL G300Ni

## INTELLIGENT NETWORK GPS RECEIVER

SKU 001-1070

G300Ni-MA-v06r03  
2021-08-04  
ENGLISH



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## 1 G300NI INTELLIGENT GPS RECEIVER WITH WIFI



## 2 DOCUMENT

### 2.1 About This Manual

This Manual provides installation, operating Instructions and fault-finding procedures for the equipment to which it relates.

This manual may also be made available in electronic Portable Document Format (PDF). In PDF format, the following categories are all enabled as active hyperlink references: (1) The titles of each section; (2) document cross-references; (3) the table of contents.

This document may therefore be navigated quickly and effectively by using a mouse or other pointing device to activate each of these hyperlinks. This is a printer friendly document, designed to be printed 2-sided as a booklet with A5 pages on A4 stock paper.

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G300Ni-MA-v06r01	2019-10-01	First Release	TSI / JV
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## 4 GENERAL NOTICES

-  SAFETY: Make sure the power supply is switched off before you make any electrical connections to the unit.
-  INSTALLATION: This equipment must be installed in accordance with the instructions provided in this manual. Failure to do so could result in poor performance, personal injury and/or damage to your vessel and/or connected equipment.
-  CONNECTION: To ensure the performance of the unit, as part of the installation it is recommended that adequate grounding is connected to the unit. Further to this, it is recommended that the power input supply is provided by a clean DC source with filtering if required.
-  CABLES: The supplied cables should only be cut, shortened or lengthened by an appropriate supplier.

In accordance with a policy of continual development and product improvement, hardware and software may be upgraded from time to time, and future versions of equipment may therefore not correspond exactly with this manual.

When necessary, upgrades to the product will be accompanied by updates or addenda to this manual. Information contained in this manual is liable to change without notice.

Comar Systems Ltd. disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

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.

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## 5 INTRODUCTION

The G300Ni from Comar Systems is a compact GPS Receiver equipped with Ethernet, WiFi and USB Interfaces for land-based, shore side monitoring.

The G300Ni is based on the popular *Raspberry Pi™*<sup>1</sup> mini-computer. The G300Ni is primarily intended for developers to implement within their own networks.

Before operating the unit you should familiarise yourself with this user manual. The G300Ni is intended to be developed continually, therefore this manual should be considered as a guide

### 5.1 Parts List

On delivery, carefully inspect the contents of the packing case. Note any damage or any missing items. Ensure that the correct parts are included for your application.

Item:	Description:	No. included:	COMAR SKU Number:
1	G300Ni GPS Receiver - Unit	1	001-1070
2	Universal Power Supply	1	004-7128

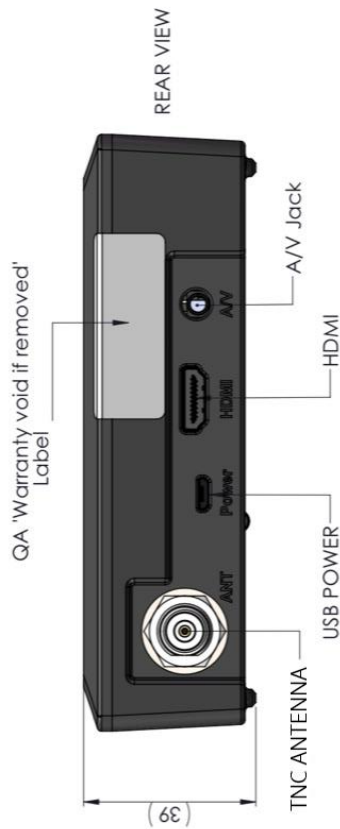
---

<sup>1</sup> For the latest information on Raspberry Pi™ computers and operating systems please refer to [raspberrypi.org](http://raspberrypi.org)



## 6 MAJOR DIMENSIONS

All dimensions mm:



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## 7 INSTALLATION

### 7.1 Mounting

Before starting installation select a suitable location. The G300Ni from COMAR SYSTEMS is intended to be used indoors as part of a land-based installation. It should be installed in a cool, dry place away from excessive vibration and shocks and can be mounted to a suitable bulkhead or shelf.

### 7.2 Power Supply

Fit the universal power supply<sup>2</sup> with the correct adaptor for your local power. Connect the Antenna & Ethernet cables first. Lastly, connect the power cable by plugging the micro-USB power jack into the micro-USB socket on the side of the G300Ni, see section 6 *MAJOR DIMENSIONS*. Provided that the unit is configured correctly, the receiver will immediately begin the boot process. Refer to section 8 *CONFIGURATION*.

### 7.3 GPS Antenna

Placement of the GPS antenna is crucial to the quality of the data received. Any metal close to a GPS antenna can disturb the signal in an unpredictable way due to interference from reflections of weak GPS signals.

Mount the antenna as high up as possible. The GPS antenna must have a direct view of GPS satellites with an unobstructed line of sight to the sky.

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<sup>2</sup> In the unlikely event of power supply failure it is possible to use any micro-USB plug pack capable of delivering 1.2 A of power, e.g. a phone or a tablet charger.

## 8 CONFIGURATION

There are several methods to configure the R500Ni unit, ranging from the standard configuration using a keyboard and mouse directly connected to the unit, or by using VNC or SSH which are done via a network.

### 8.1 Getting Started

#### 8.1.1 Standard Setup

Connect the keyboard, mouse and monitor and power on the unit. When prompted enter the username and password for Rasbian, which are the standard settings:

**User:** pi.

**Password:** raspberry

**Note:** It is recommended to change the default login details.

This will then boot directly into the desktop frontend of the Rasbian as shown below:



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## 8.1.2 VNC Setup

The remote access software VNC is pre-installed, which enables you to connect to your unit via VNC. You will firstly need to download and install a VNC client, such as VNC Viewer on a computer in the same network as your unit. One example for a VNC client is RealVNC: [www.realvnc.com](http://www.realvnc.com).

Once your client is installed, ensure the R500NGi is powered on and connected to your network via ethernet or WiFi. Follow the instructions of the VNC client to connect to the VNC server on your R500Ni unit.

The login details for VNC are the default Raspbian settings:

**User:** pi

**Password:** raspberry

**Note:** It is recommended to change the default login details.

## 8.1.3 SSH Setup

SSH is enabled on the Raspbian install of your unit. SSH is a software package that enables secure system administration and file transfers over insecure networks. To connect to your unit via SSH use the standard login details for Raspbian:

**User:** pi

**Password:** raspberry

**Note:** It is recommended to change the default login details.

## 8.2 Software Configuration

### 8.2.1 OpenCPN

Default plotter software, OpenCPN, is installed on your unit. To start OpenCPN just click on the OpenCPN icon on the desktop:

The internal AIS module is already set up and once OpenCPN is started and you have received the first AIS messages with your unit (channel A or B briefly flashing) you should see the data displayed on the map.

For more information about OpenCPN, please visit: [www.opencpn.org](http://www.opencpn.org)



## 9 RE-INSTALLING SOFTWARE

This section is intended to instruct in the installation of open source software on the Comar G300Ni. Third party proprietary networked implementations of the G300Ni are outside the scope of this manual. The micro computer embedded in the G300Ni is a *Raspberry Pi 3™* unit.

### 9.1 Installing Open Source Software

The G300Ni is shipped without software and can be installed with any operating system that works on the Raspberry Pi 3™ micro computer. Full information and additional details can be found on the Raspberry Foundation website: <https://www.raspberrypi.org/>

The G300Ni can run a number of operating systems and these are listed and explained on the official Raspberry Foundation website. Comar Systems recommend using *Raspbian*, the official operating system (OS) for the Raspberry Pi, which is a Linux based OS. The following information is based on the assumption that you will be using Raspbian. It is an open source operating system and can be freely downloadable from the internet.

The examples in this section are based on the Raspbian OS. This section describes an example of how to download and install software to receive data from the G300Ni.

### 9.2 Requirements

You will need the following:

1. The Comar G300Ni and power supply
2. A MicroSD data storage card. Comar recommends a high quality branded card of at least 8 GB capacity
3. USB Mouse and keyboard or USB Bluetooth
4. A monitor with an HDMI3 connection
5. A connection to the internet, either using Wi-Fi or ethernet via the RJ45 port. Comar always recommends using a direct cable connection via the RJ45 port while installing the system software
6. A GPS Antenna, we recommend the Comar AG100.
7. A computer (PC or Mac) connected to the internet

### 9.3 Installing the Raspbian OS

Raspbian is the official Operating System for the Raspberry Pi Foundation. You have two options to install Raspbian on an SD card:

1. The New Out Of Box Software (NOOBS) option
2. Installing an SD image directly

We recommend the NOOBS option.

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<sup>3</sup> High-Definition Multimedia Interface

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- To install the Raspbian OS, follow this easy guide for both options:  
<https://www.raspberrypi.org/learning/software-guide/quickstart/>

There are two versions of the operating system:

1. A full operating system with graphical user interface and networking
2. A 'lite' version with no graphical user interface and reduced functionality.

The instructions below are based on installing the full GUI version of Raspbian.

Once you have installed the operating system you will want to get access to the GPS data from the inbuilt GPS receiver. The GPS data is a NMEA stream on the internal serial port and once set up it can be viewed, stored or transferred to an application or other device.

To use the GPS receiver you have to enable the serial port and set the communication parameters. This applies to all uses of the G300Ni; see below.

## 9.4 Enabling the Serial Port

In the later *Jessie*<sup>4</sup> releases the GPIO serial port is disabled by default. In order to enable it, you will need to edit config.txt using the terminal emulator on the toolbar, as follows:

Once you have Raspbian running on Raspberry Pi, go to Menu → Accessories → Terminal, and type:

```
sudo nano /boot/config.txt
```

A text editor will open. Move the cursor to the end of the file and add this line:

```
enable_uart=1
```

This will also lock the cpu core frequency for you so there's nothing else you need to do.

(The full command for locking the CPU core frequency is: `core_freq=250` which you add to the same file as well).

```
core_freq=250
```

Save the file by pressing Ctrl+X, say Yes and press enter. Reboot for the changes to take effect.

Now type:

```
sudo reboot
```

This will restart the system.

Once the G300Ni is back up and running, check the status of the serial port.

Go to Menu → Accessories → Terminal, and type:

```
$ ls -l /dev
```

---

<sup>4</sup> May 2016

- NOTE: Use lower case 'L' not '1' or any other character

You should see the serial port `ttyS0` with the alias of `serial0` displayed part way down the list:

```
crw-rw-r-- 1 root root    10,  58 May 28 12:14 rfdisk
lrwxrwxrwx 1 root root      5 May 28 12:14 serial0 -> ttyS0
lrwxrwxrwx 1 root root      7 May 28 12:14 serial1 -> ttyAMA0
drwxrwxrwt 2 root root    40 May 28 12:15 shm
```

The next step is to disable the remote console which by default uses the internal serial port `ttyS0` which is also the same serial port the GPS receiver uses in the G300Ni. To do this, type:

```
$ sudo systemctl stop serial-getty@ttyS0.service
$ sudo systemctl disable serial-getty@ttyS0.service
```

You also need to remove the console from the `cmdline.txt`. You edit this with the following line:

```
$ sudo nano /boot/cmdline.txt
```

You will then see a response similar to this:

```
dwc_otg.lpm_enable=0 console=serial0,115200 console=tty1 root=/dev/mmcblk0p2
rootfstype=ext4 elevator=deadline fsck.repair=yes root wait
```

Remove the text:

```
console=serial0,115200
```

The code should now look something like this:

```
dwc_otg.lpm_enable=0 console=tty1 root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline
fsck.repair=yes root wait
```

Save the file by pressing `Ctrl+X`, use option `Yes` and press `Enter`. Reboot for changes to take effect.

```
$ sudo reboot
```

Finally you need to set the speed and enable the port `ttyS0` for the GPS stream.

## 9.4.1 Setting and testing the serial port to receive GPS data

First, set the serial port to the Baud rate of 4800:

```
$ stty -F /dev/ttyS0 4800
```

Make sure that the GPS antenna is connected. You should now be receiving GPS data on the internal serial port.

To check that the data sentences being received are formatted correctly you will need to examine the data. This can be done either on the screen or by redirecting it to a file as follows:

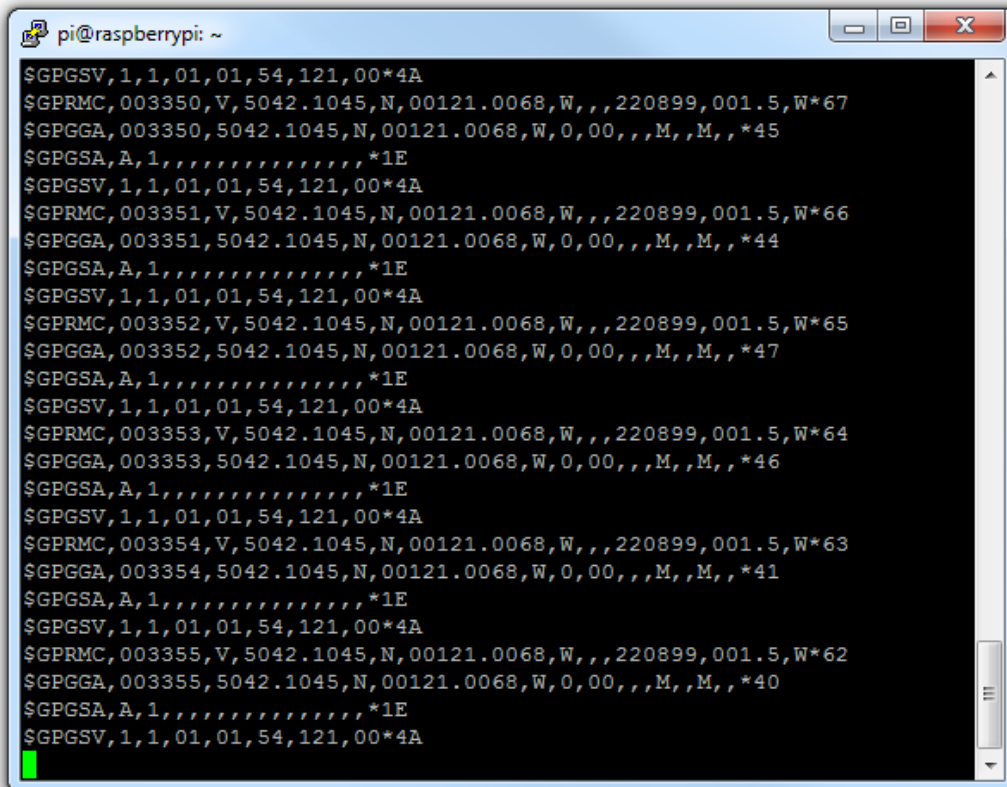
```
$ cat /dev/ttyS0 > ./test.txt
```

This command line will put all the data received into a file named `./test.txt` which can then be viewed:

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```
$ more ./test.txt
```

You will see something like this formatted GPS data:

A terminal window titled 'pi@raspberrypi: ~' displays a stream of formatted GPS data. The data consists of several lines of NMEA sentences, including \$GPGSV, \$GPRMC, \$GPGGA, and \$GPGSA. Each sentence is formatted with commas and asterisks, representing standard NMEA output. The window has a blue title bar and standard window controls (minimize, maximize, close) in the top right corner. A green cursor is visible at the bottom left of the terminal area.

```
pi@raspberrypi: ~
$GPGSV,1,1,01,01,54,121,00*4A
$GPRMC,003350,V,5042.1045,N,00121.0068,W,,220899,001.5,W*67
$GPGGA,003350,5042.1045,N,00121.0068,W,0,00,,M,,M,,*45
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,01,01,54,121,00*4A
$GPRMC,003351,V,5042.1045,N,00121.0068,W,,220899,001.5,W*66
$GPGGA,003351,5042.1045,N,00121.0068,W,0,00,,M,,M,,*44
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,01,01,54,121,00*4A
$GPRMC,003352,V,5042.1045,N,00121.0068,W,,220899,001.5,W*65
$GPGGA,003352,5042.1045,N,00121.0068,W,0,00,,M,,M,,*47
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,01,01,54,121,00*4A
$GPRMC,003353,V,5042.1045,N,00121.0068,W,,220899,001.5,W*64
$GPGGA,003353,5042.1045,N,00121.0068,W,0,00,,M,,M,,*46
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,01,01,54,121,00*4A
$GPRMC,003354,V,5042.1045,N,00121.0068,W,,220899,001.5,W*63
$GPGGA,003354,5042.1045,N,00121.0068,W,0,00,,M,,M,,*41
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,01,01,54,121,00*4A
$GPRMC,003355,V,5042.1045,N,00121.0068,W,,220899,001.5,W*62
$GPGGA,003355,5042.1045,N,00121.0068,W,0,00,,M,,M,,*40
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,01,01,54,121,00*4A
```

If strange characters are displayed or data sentences are not formatted correctly then the Baud rate settings may need checking for the serial port. In this case, repeat the procedure for setting up the serial port.



## 10 GPS RECEIVER

The G300Ni contains an integral GPS receiver allowing positional data to be output from the receiver.

A standard active 3.3 or 5 volts dc GPS antenna with a gain between 10 and 30 dB needs to be connected to the TNC connector on the rear of the G300Ni for the GPS receiver to work.

By default the GPS receiver will output the following NMEA messages:

GPGGA, GPGSA, GPGSV, GPRMC

### 10.1 GPS Receiver Technical Specification

Channels: 12 Parallel Channels

Frequency: 1575.42 MHz

WAAS: Yes

Update Rate: 1 sec

Hot Start: 2 sec

Warm Start: 15 sec

Cold Start: 45 sec

## 11 TROUBLESHOOTING

### 11.1 No power / Raspberry Pi not booting

Check the power supply and that the unit is connected correctly to the 5V dc supply

Check the SD-Card is inserted correctly

### 11.2 No GPS data

Check the serial port is set up as described in section *9.4 Enabling the Serial Port*

The GPS module will output valid data even if there is no GPS antenna connected to the device

### 11.3 The GPS is not detecting any satellites

Check the GPS antenna setup. Please see section *7.3 GPS Antenna*

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## 12 SPECIFICATIONS

12.1 Physical	
Weight:	400g
Dimensions:	L 135 mm W 80 mm D 39 mm
Mounting:	To flat surface; 2 holes in case bottom
Connections:	Micro USB (Power) RJ45 Ethernet 10 / 100 Base-T 4x USB 2.0 type A socket TNC Coaxial to GPS antenna Micro-SD card slot
Construction:	Plastic housing

12.2 Electrical and Electronic	
Power Supply:	5 V dc; 900 – 1200 mA typical
Antenna Impedance:	50 $\Omega$
USB power:	100 mA each port (max)

12.3 Operational	
Frequency	GPS: 1575.42MHz
Sensitivity:	< -112 dBm
Microcomputer:	1.2 GHz 64bit quad-core ARM v8 CPU
WiFi:	802.11n
Data Types Received:	Standard - GPRMC GPGGA GPGSA GPGSV Optional - PGRME GPGLL GPVTG PGRMV PGRMF PGRMB PGRMM PGRMT

12.4 Environmental	
IP Rating:	IP40
Operating temp:	-15°C to +55°C
Compass:	Safe Distance 50 cm

11.5 Additional Information	
Supplied:	G300Ni receiver (without software)
Option 1:	G300Ni receiver with standard configuration software
Option 2:	G300Ni receiver with bespoke data management software

## 13 SAFETY AND SECURITY

Please observe the following procedures to ensure safety of personnel installing and operating the equipment:

1. Ensure all power to the unit is disconnected and locked-out during installation, maintenance and removal procedures
2. Ensure power is disconnected and locked-out in the event of mechanical damage to the unit, rendering internal parts accessible to personnel
3. Only the electrical power of the specified voltage should be connected to the unit
4. The panel to which the unit is mounted should be designed to provide adequate mechanical support. This minimises the possibility of damage or injury caused under mechanical shock conditions
5. Care should be taken to ensure the fixings used to mount the unit to the panel are correctly fitted and retain their mechanical integrity over time

## 14 LIMITED WARRANTY

COMAR SYSTEMS LTD. warrants this product to be free from defects in materials and manufacture for one year from the date of purchase. Comar Systems Ltd will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour. The customer is, however, responsible for any transportation costs incurred in returning the unit to Comar Systems Ltd.

This warranty does not cover failures due to abuse, misuse, accident or unauthorised alteration or repairs.

The above does not affect the statutory rights of the consumer.

Changes or modifications not made by Comar Systems or an authorised repairer will: (1) Void the warranty issued by Comar Systems (2) Void the user's authority to operate the equipment.

**Note: Every effort has been made to ensure that all information contained in this manual is accurate at the time of going to press. We therefore cannot take any responsibility for the content and advise that you take normal steps to ensure that the information is at its most current when you are reading this manual.**



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