

# BECKER

## **Remote-Controlled Navigation Receiver**

**RN3320**

**RN3330**

### **Installation and Operation**

Manual DV60603.03

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## Approved Production and Maintenance Organization

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### WARNING - USER RESPONSIBILITY

**FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

This document and other information from Becker Avionics provide product or system options for further investigation by users having technical knowledge.

The user is responsible for making the final selection of the system and components. The user has to assure that all performance, endurance, maintenance, safety requirements of the application are met and warnings be obeyed.

For this the user has to include all aspects of the application to be compliant with the applicable industry standards and the requirements of the responsible aviation authority. The product documentations from Becker Avionics have to be obeyed.

To the extent that Becker Avionics provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Term definition: User in the sense of user, installer, installation company.

## Preface

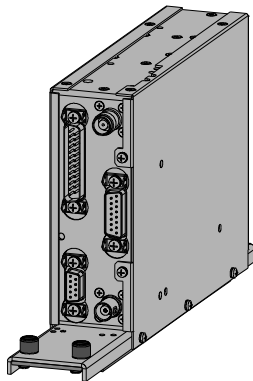
Dear Customer,

Thank you for purchasing a Becker Avionics product. We are pleased that you have chosen our product and we are confident that it will meet your expectations.

For development and manufacturing of our product, the guidelines for highest quality and reliability have been borne in mind, supplemented by selection of high-quality material, responsible production and testing in accordance to the standards.

Our competent customer support department will respond on any technical question you may have. Please do not hesitate to contact us at any time.

### Navigation Receiver\*



Remote-controlled Navigation Receiver  
RN3320, RN3330

\* design depends on variant

\* Some figures in this manual are for basic understanding and can be different to the actual design.

### List of Effective Pages and Changes

Only technical relevant modifications are described in this table.

<b>Document:</b>		<b>DV60603.03 / issue 02</b>	<b>Article Number 0511.609-071</b>
Cover Page		11/2019	
Introduction		11/2019	
Chapter 1 – 4		11/2019	
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<b>02</b>	1-48	all	Changed: Editorial adjustments.
	1-48	all	Added: More detailed descriptions.
	--	1.9.2	Updated: Accessories.
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## List of Abbreviations

### List of Abbreviations

AM	Amplitude Modulation
ARINC	Aeronautical Radio Incorporation
BAPT	Bundesamt für Post und Telekommunikation (since 07/2010 Bundesnetzagentur)
CU	Control Unit
DME	Distance Measuring Equipment
EEPROM	Electrical Erasable Programmable Read-only Memory
FAA	Federal Aviation Administration
FTZ	Fernmelde-Technisches Zentralamt
GS	Glideslope
ILS	Instrument Landing System (LOC, GS Signals)
LBA	Luffahrt-Bundesamt
LOC	Localizer
NAV	Navigation
OBS	Omni Bearing Selector
RMI	Radio-Magnetic Indicator
RMU	Radio Management Unit
VCO	Voltage Controlled Oscillator
VOR	Very High Frequency Omnidirectional Radio Range

## Units

### Units

A	Ampere
mA	Milliampere
°C	Degree Celsius
cm	Centimeter
dBm	Power Ratio in Decibel referenced to 1 mW
dB	Decibel
g	Gram
kg	Kilogram
kHz	Kilohertz
MHz	Megahertz
mm	Millimeter
Ohm ( $\Omega$ )	Resistance
s	Second
V	Volt
mV	Millivolt
W	Watt
mW	Milliwatt
"	Inch
°	Angular degree

## General Safety Definitions



Indicates a hazardous situation which, if not prevented, will result in death or serious injury.



Indicates a hazardous situation which, if not prevented, could result in death or serious injury.



Indicates a hazardous situation which, if not prevented, could result in minor or moderate injury.



Is used to address practices not related to physical injury.



Safety instructions (or equivalent) signs indicate specified safety-related instructions or procedures.



## Disposal

**⚠ CAUTION** | The packaging material is inflammable by burning, toxic fumes may develop.

This product contains materials that fall under the special disposal regulation. We recommend the disposal of such materials in accordance with the current environmental laws.

- Dispose circuit boards by a technical waste dump which is approved to take on e.g. electrolytic aluminium capacitors. Do under no circumstances dump the circuit boards with normal waste dump.

## Warranty Conditions

**⚠ CAUTION** | The device(s) may be installed on an aircraft only by an approved aeronautical company (e.g. Part 145) which shall also examine the installation.

Any change made by the user excludes any liability on our part (excluding the work described in this manual).

- The device must not be opened.
- Do not make any modifications to the device, except for those described in the manual.
- Make connections to the inputs, outputs and interfaces only in the manner described in the manual.
- Install the devices according to the instructions.  
We cannot give any guarantee for other methods.

## Conditions of Utilization

With this device you bought a product which was manufactured and tested before delivery with the utmost care.

Please take your time to read the instructions which you ought to follow closely during installation and operation.

Otherwise all claims under the warranty will become void and a decreased service life or even damages must be expected.

**⚠ CAUTION** | The user is responsible for protective covers and/or additional safety measures in order to prevent damages to persons and electric accidents.

## Additional Conditions of Utilization

Please refer to "Safety-Conscious Utilization", page 18.

## Non-Warranty Clause

We checked the contents of this publication for compliance with the associated hard and software. We can, however, not exclude discrepancies and do therefore not accept any liability for the exact compliance. The information in this publication is regularly checked, necessary corrections will be part of the subsequent publications.

**Blank Page**

## 1 General Description

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This manual describes the Becker Avionics remote-controlled navigation receivers RN3320-(XX) and RN3330-(XX). The type plate on your device shows the part number for identification purposes (see "Type Plate", page 27).

Before starting operation of the device(s) please read this manual carefully, with particular attention to the description referring to your device(s).

## Introduction

**1.1 Introduction**

The technical information in this document applies to the described product(s) RN3320-(XX) and RN3330-(XX).

- We also use the term RN33XX, for descriptions instead writing the complete model number.
- If a description refers to only one of the product variants its full name is used or it is specified accordingly.

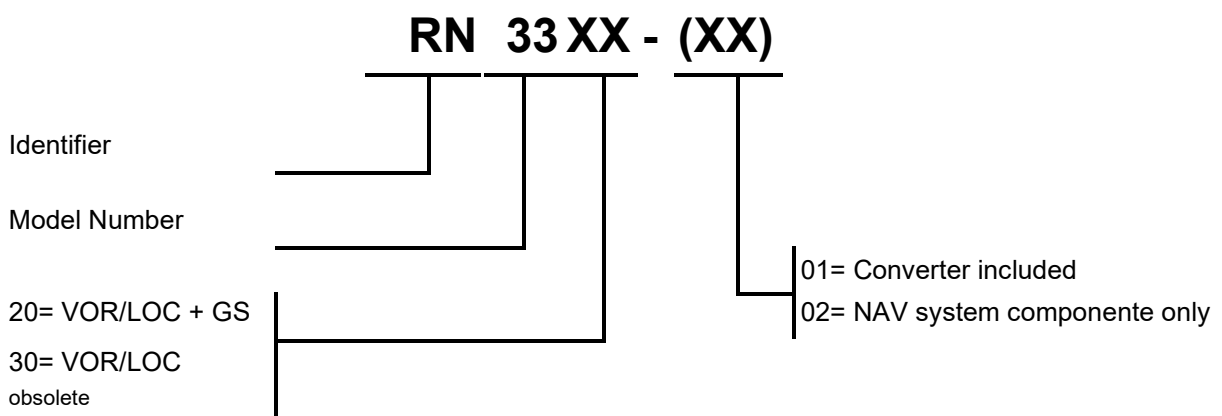
The manuals "Maintenance and Repair" (**M&R**), "Installation and Operation (**I&O**) contain the sections:

<b>Section</b>	<b>DV60603.04 M&amp;R</b>	<b>DVx60603.03 I&amp;O</b>
General	X	X
Installation	X	X
Operation	X	X
Theory of Operation	X	N/A
Maintenance and Repair	X	N/A
Illustrated Parts List	X	N/A
Modification and Changes	X	N/A
Circuit Diagrams	X	N/A
Certifications	X	N/A
Attachments	X	N/A

## 1.2 Purpose of Equipment

- The Becker navigation receivers RN33XX are made to receive and convert VOR and LOC signals.
  - RN3320, RN3330: Reception and evaluation of VOR- and LOC-signals in the frequency range 108...117.95 MHz on 200 channels.  
RN3320 additionally: Reception and evaluation of glide path signals (GS) in the frequency range 329.15...335.00 MHz on 40 channels.
  - The receivers provide the NAV composite signal to an external VOR/LOC converter.
- RN33XX use RS422 interfaces for communication with a control device.

## 1.3 Variants Overview



### 1.3.1 Software Status

Descriptions see "Software/Firmware Status – Functionality", page 27.

## 1.4 Associated Devices

These devices can operate with RN3320/RN3330:

Device	Function
CU5301	Becker Avionics Control Unit
RMU5000	Becker Avionics Radio Management Unit
Glass cockpit	Third party product

This manual describes the operation and installation of the navigation receivers RN3320/RN3330 from Becker Avionics. For other devices please refer to the corresponding manuals.

### 1.4.1 Overview

Examples: Possible equipment combinations:

\*designs depend on variants



Becker Avionics  
Control Unit CU5301



Becker Avionics  
NAV Receiver & Indicator  
RN33XX & IN3300



Becker Avionics  
Marker & Marker Lamps



Becker Avionics  
Control Unit CU5301



Becker Avionics  
NAV Receiver & Indicator  
RN33XX & IN3300



Becker Avionics  
NAV Converter & Third Party RMI Indicator  
(optional)



Becker Avionics  
Marker & Marker Lamps



Glass Cockpit



Becker Avionics  
NAV Receiver  
RN33XX



Becker Avionics  
NAV Converter & Third Party RMI Indicator  
(optional)



Becker Avionics  
Marker & Marker Lamps

## 1.5 Scope of Functionality

The mechanical construction of RN33XX is for installation in aircraft including rotary wing aircraft.

- The RN33XX is made for installation in the avionics compartment.
- All connectors are on the front side of the device.
- Installation via mounting plate.



Figure 1: RN33XX Navigation Receiver\*

\*design depends on variant

The device consists of these circuit boards:

- Chassis Board.
- Processor Board.
- Interface Board.
- VOR/LOC Receiver Board.
- VOR/LOC Converter Board (depends on variant).
- GS Receiver Board (depends on variant).

### 1.5.1 Receiver - VOR/LOC/GS

The Becker navigation receivers RN33XX are made to receive and convert VOR and LOC signals.

- The RN3320, RN3330 is for reception and evaluation of VOR- and LOC-signals. The converted signals can be read off with the connected VOR/ILS indicator.
  - Frequency range: 108...117.95 MHz on 200 channels.
  - Channel separation of 50 kHz.
- The RN3320 is additionally for reception and evaluation of glide path signals (GS). The evaluated glide path signals are indicated by the GS needle of the connected VOR/ILS indicator.
  - Frequency range 329.15...335.00 MHz on 40 channels.
  - Channel separation of 150 kHz.

### 1.5.2 Data Transfer / Data Availability

After power on, an initialization procedure is started between navigation receiver and control device.

### 1.5.3 Communication Interface

The navigation receiver RN33XX has a RS422 interface for communication data transmission with the control device.

#### 1.5.4 Signal Interface (Indicators)

Indicators made by other manufacturers and with standard ARINC resolver are compatible with the VOR/LOC converter of the navigation receiver and may be used.

#### 1.5.5 Additional Pointers and Flags

It is possible to connect up to two analog instruments parallel to the indicator without altering the navigation receiver.

For example, instruments with:

- VOR/LOC pointer, VOR/LOC warning flag.
- TO/FROM indication.
- GS pointer and GS warning flag.

#### 1.5.6 Autopilot (VOR/LOC and GS)

The navigation receiver has outputs for connection of an autopilot.

#### 1.5.7 VOR/LOC and GS Super Flags

The converted VOR/LOC and GS signals can be feed to the super flag inputs of course guidance systems (controlled by the super flag control outputs).

For further details please see "Aircraft Wiring" page 35.

#### 1.5.8 ILS Mode Control Function

The ILS mode control function can be used to operate an Instrument Flight Control (IFC) system or similar systems, such as automatic switching of an autopilot to VOR and ILS modes.

For further details please see "Aircraft Wiring" page 35.

#### 1.5.9 Audio Output

The audio output of the navigation receiver is set to a symmetrical audio output on delivery.

- A symmetrical selection system or head set can be connected.

The audio output can also be changed to an asymmetric audio output.

For further details please see "Aircraft Wiring" page 35.

#### 1.5.10 Self-Test

The self-test of the navigation receiver can be initiated by the user.

- With the TEST function through a control device a functional check will be started.
- The VOR/LOC evaluation and GS evaluation will be examined.



**1.5.11 Special Features****1.5.11.1 Remote-Control of a DME Device**

The NAV receiver is made for the connection of a remote-controlled DME device with parallel signal transmission in 2-out-of-5 code.

## 1.6 Safety-Conscious Utilization

### ⚠ CAUTION

The device(s) may be installed on an aircraft only by an approved aeronautical company (e.g. Part 145) which shall also examine the installation.

### SAFETY INSTRUCTIONS

- The installation of the device into an aircraft may be carried out only by an authorized installation company. The country regulations always have to be obeyed.
- Use the product only in the specified conditions, see "Technical Data", page 19.
- Power supply:
  - Do not connect the device to AC sources.
  - Make sure that the device is connected to the mandatory DC source, see "Technical Data", page 19.
  - Do not connect the device with reversed polarity to the DC source.
    - Circuit breaker:
  - Use the recommended fuses in the power supply line for protection of the application, see "Technical Data", page 19.

### NOTICE

#### Cleaning:

- Do not use aggressive cleaning agents e.g. Acetone.
- These cleaning agents can cause damages.

### NOTICE

Excessive pulses on the DC bus of the aircraft may cause damage on electrical circuits of any installed instrument.

Do not power-on the device during engine start or shutdown.

## 1.7 Restriction for Use

### SAFETY INSTRUCTIONS

The product is to be used inside the declared limits.

## 1.8 Technical Data

### 1.8.1 General Characteristics

RN3320/RN3330	Specifications
Power supply voltage	12.4...30.1 VDC
Current consumption @27.5 V	RN3320: 340 mA RN3330: 260 mA
Emergency supply voltage	10 VDC
Internal fuse protection	1.5 A
Recommended external fuse protection	1 A
Operating temperature	-55...+55 °C (short time +70 °C)
Storage temperature	-55...+85 °C
Max. operating altitude	50 000 ft
Interface	RS422

### 1.8.2 VOR/LOC Receiver

RN33XX	Specifications
	<b>RN3320/RN3330 - VOR/LOC Receiver Features</b>
Receiver type	Triple-conversion superheterodyne receiver
Frequency range	108.00...117.95 MHz
Intermediate frequency	IF1: 71.05 MHz IF2: 21.40 MHz IF3: 455 kHz
Number of channels	200
Channel spacing	50 kHz
Selectivity	≥ 65 dB @ $\Delta F \geq \pm 50$ kHz
Bandwidth	≥ 12 kHz @ 6 dB
Sensitivity	≤ -93 dBm for ≥ 6 dB (S+N)/N
AGC	≤ 3 dB from -87...-10 dBm
AF distortion	≤ 10%
AF rated output	150 mW into 300 Ω
Function VOICE	≥ 20 dB attenuation @ 20 Hz
NAV signal (composite)	500 mV @ 30 Hz, mod = 30%
DME remote control	parallel, with 2-out-of-5 code in accordance with ARINC 410

<b>RN33XX</b>	<b>Specifications</b>
	<b>RN3320/RN3330 - VOR/LOC System Features</b>
Bearing error	Standard Conditions: $\leq \pm 1^\circ$ with precision resolver (ARINC 407) Environmental Conditions (95% probability): $\leq \pm 2.7^\circ$ with precision resolver (ARINC 407)
Course deviation for full scale deflection	$\pm 10^\circ$
Course deviation current	15 $\mu$ A per $1^\circ$ course deviation
LOC centering error	Environmental Conditions (95% probability): $\leq 11\%$ of standard deviation
LOC standard deviation current	90 $\mu$ A per 1000 $\Omega$ load
	<b>RN33XX-(01) - variants only</b>
Resolver output	Standard value as per ARINC 407
VOR/LOC needle output	max. of 3 pointers and/or flags with 1 k $\Omega$ each
VOR/LOC warning flag output	max. of 3 pointers and/or flags with 1 k $\Omega$ each
TO/FROM output	max. of 3 pointers and/or flags with 1 k $\Omega$ each
Autopilot output	for VOR course tracking and ILS mode

### 1.8.3 GS Receiver

<b>RN3320</b>	<b>Specifications</b>
Receiver type	Single-conversion superheterodyne receiver
Frequency range	329.15...1335.00 MHz
Intermediate frequency	21.40 MHz
Number of channels	40
Channel spacing	150 kHz
Selectivity	$\geq 42$ dB @ $\Delta F \geq \pm 150$ kHz
Bandwidth	$\geq \pm 20$ kHz @ 6 dB
Sensitivity	$\geq -80$ dBm for Flag OFF condition
Centering error	Standard Conditions: $< 5\%$ of standard deviation Environmental Conditions (95% probability): $< 13\%$ of standard deviation
GS-needle output	max. of 3 needles and/or flags with 1 k $\Omega$ each
GS-warning flag output	max. of 3 needles and/or flags with 1 k $\Omega$ each
GS-autopilot output	max. of 3 needles and/or flags with 1 k $\Omega$ each

#### 1.8.4 Dimensions & Weight

RN33XX (inclusive mounting plate)	Specifications
Dimensions HxWxD	139.3 x 50 x 253 mm
Weight	≤ 0.8 kg
Mounting	Mounting plate (5 mounting holes)
Slide-In slot + Interlock	Two quick-release studs (DZUS)

#### 1.8.5 Software

In accordance with EUROCAE / RTCA document ED-12B/DO-178B the software was classified as:

**LEVEL C**

#### 1.8.6 Hardware

The RN3320/RN3330 do not contain Complex Electronic Hardware (CEH).

#### 1.8.7 Continued Airworthiness

- The RN3320 maintenance is defined as "on condition" only.
- The RN3330 maintenance is defined as "on condition" only.

### 1.8.8 Environmental Condition

RN3320/RN3330 were tested in accordance with EUROCAE/RTCA Document No. ED-14C/DO-160C under consideration of below listed environmental categories and conditions:

Characteristics	Section	Cat.	Condition
Temperature and Altitude	4	D2	
Ground Survival Low Temperature	4.5.1	D2	-55 °C
Operating Low Temperature	4.5.1	D2	-55 °C
Ground Survival High Temperature	4.5.2	D2	+85 °C
Short-Time Operating High Temperature	4.5.2	D2	+70 °C
Operating High Temperature	4.5.3	D2	+50 °C
In-flight Loss of Cooling	4.5.4	D2	No cooling required
Altitude	4.6.1	D2	50 000 ft
Decompression	4.6.2	D2	from 8000...50 000 ft
Overpressure	4.6.3	D2	-15 000 ft
Temperature Variation	5	B	5 °C per minute
Humidity	6	A	50 °C / 48 h / RH > 95%
Shock and Crash Safety	7.2	-	11 ms / 6 G / 3 axes
Operational Shocks	7.3.1	-	11 ms / 15 G / 3 axes
Crash Safety	7.3.2	-	12 G acceleration / 3 axes
Vibration	8	M, N	Equipment tested without shock-mounts
Explosion Proofness	9	X	No test performed
Water Proofness	10	X	No test performed
Fluids Susceptibility	11	X	No test performed
Sand and Dust	12	X	No test performed
Fungus Resistance	13	X	No test performed
Salt Spray	14	X	No test performed
Magnetic Effect	15	Z	Deflection of 1° of a compass at a distance of < 30 cm
Power Input	16	B	
Voltage Spike	17	A	
Audio Freq. Conducted Susceptibility	18	B	
Induced Signal Susceptibility	19	A	
Radio Frequency Susceptibility	20	T	
Emission of Radio Frequency Energy	21	A	
Lightning Induced Transients Susceptibility	22	X	No test performed
Lightning Direct Effects	23	X	No test performed
Icing	24	X	No test performed

### 1.8.9 Certifications

RN3320/RN3330 meet the requirements of:

Specification	Description
JTSO-C34e	ILS Glide Slope Receiving Equipment Operating within the Radio Frequency Range of 328.6...335.4 MHz)
JTSO-C36e	Airborne ILS Localizer Receiving Equipment Operating within the Radio Frequency Range of 108...112 MHz
JTSO-2C40c	VOR Receiving Equipment Operating within the Radio Frequency Range of 108...117.95 MHz
RTCA DO-192	Minimum Operational Performance Standards for Airborne ILS Glide Slope Receiving Equipment Operating within the Radio Frequency Range of 328.6...335.4 MHz, July 1986
RTCA DO-195	Minimum Operational Performance Standards for Airborne ILS Localizer Receiving Equipment Operating within the Radio Frequency Range of 108...112 MHz, November 17, 1986
RTCA DO-196	Minimum Operational Performance Standards for Airborne VOR Receiving Equipment Operating within the Radio Frequency Range of 108...117.95 MHz, November 17, 1986
EUROCA/RTCA ED-14C/DO-160C	Environmental Conditions and Test Procedures for Airborne Equipment, December 12, 1989
EUROCAE/RTCA ED-12B/DO-178B	Software Considerations in Airborne Systems and Equipment Certification, October 1985
FTZ 17 TR 2010	Technische Richtlinie für Funkanlagen in Luftfunkstellen des mobilen Flugfunk- und des Flugnavigationfunkdienstes

Certificate	Description
A132882J	"Bundesamt für Post und Telekommunikation"(BAPT), today "Bundesnetzagentur"
LBA.O.10.922/94 JTSO according to JAR-21, Subpart O and JAR-TSO JTSO-C34e, JTSO-C36e and JTSO-2C40c	<b>JAA: Joint Aviation Authorities</b> JTSO Authorisation
VDA0025	<b>CAA: General Administration of Civil Aviation of China</b> Certification

## 1.9 Order Code

### 1.9.1 RN33XX - Remote-Controlled Navigation Receiver

Qty		
1	RN3320-(01), remote-controlled navigation receiver with VOR/LOC and GS functions and converter, incl. mounting plate	Article-No. 0505.706-911
1	RN3320-(02), remote-controlled navigation receiver with VOR/LOC and GS functions, incl. mounting plate	Article-No. 0506.141-911 on request
1	RN3330-(01), remote-controlled navigation receiver with VOR/LOC functions and converter, incl. mounting plate	obsolete
1	RN3330-(02), remote-controlled navigation receiver with VOR/LOC functions, incl. mounting plate	obsolete

### 1.9.2 Accessories

Qty	Connector Kit	
1	CK3305-C: <ul style="list-style-type: none"> <li>• Connector D-Sub, 9pin, male (crimp version) +</li> <li>• Connector housing, metal coated, slide-in fastener</li> <li>• Connector D-Sub, 15pin, male (crimp version) +</li> <li>• Connector housing, metal coated, slide-in fastener</li> <li>• Connector D-Sub, 25pin, female (crimp version) +</li> <li>• Connector housing, metal coated, slide-in fastener</li> <li>• Connector BNC (VOR/LOC)</li> <li>• Connector TNC (GS)</li> <li>• Label "NAV"</li> </ul>	Article-No. 0507.113-954
1	CK3305-S: <ul style="list-style-type: none"> <li>• Connector D-Sub, 9pin, male (soldering version) +</li> <li>• Connector housing, metal coated, slide-in fastener</li> <li>• Connector D-Sub, 15pin, male (soldering version) +</li> <li>• Connector housing, metal coated, slide-in fastener</li> <li>• Connector D-Sub, 25pin, female (soldering version) +</li> <li>• Connector housing, metal coated, slide-in fastener</li> <li>• Connector BNC (VOR/LOC)</li> <li>• Connector TNC (GS)</li> <li>• Label "NAV"</li> </ul>	Article-No. 0507.121-954

Qty	Antenna Connector	
1	Connector BNC (VOR/LOC)	Article-No. 0725.706-277
1	Connector TNC (GS)	Article-No. 0725.900-277

Qty	Available Documentation	
1	(I&O) RN3320/3330 Installation & Operation (English)	Article-No. 0511.609-071
1	(M&R) RN3320/3330 Maintenance & Repair (English)	Article-No. 0511.617-071



## 2 Installation

This manual must be available to the installer during performance of all tasks.

Careful planning should be applied to achieve the desired performance and reliability from the product. Any deviations from the installation instructions prescribed in this document are under own responsibility.

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### 2.1 Packaging, Transport, Storage

Visually inspect the package contents for signs of transport damage.

**⚠ CAUTION** The packaging material is inflammable by burning, toxic fumes may develop.

Keep the packaging material and use it in the case of a return shipment. Improper or faulty packaging may lead to transport damages.

Make sure to transport the device always in a safe manner and with the aid of suitable lifting equipment if necessary. Do never use the electric connections for lifting. Before the transport, a clean,

level surface should be prepared to put the device on. The electric connections may not be damaged when placing the device.

### First Device Checkup

- Do a check for signs of damages.
- Please make sure that the indications on the type plate agree with your purchase order.
- Make sure that the equipment is complete ("Scope of Delivery", page 26).

### Storage

If you do not wish to mount and install the device immediately, make sure to store it in a dry and clean environment. Make sure that the device is not stored near strong heat sources and that no metal chippings can get into the device.

## 2.2 Device Assignment

This manual is valid for the devices:

- RN3320-(01) + accessoires.
- RN3320-(02) + accessoires.
- RN3330-(01) + accessoires.
- RN3330-(02) + accessoires.

### 2.2.1 Scope of Delivery

- Manuals
  - Installation & Operation manual
- Remote-Controlled Navigation Receiver
  - RN33XX-(0X) (corresponding to your ordered version)
- Authorized Release Certificate (EASA Form 1)

### 2.2.2 State of Delivery

- RN33XX is ready for use.
  - Ready for use with factory default settings.

### 2.2.3 Additional Required Equipment

(depends on system)

- Connector kit + cables
- Antennas + antenna cables
- Control device (controlling and operating the navigation receiver)
- Indicator
- Marker receiver
- Marker signal lamps

Details see "Accessories", page 24.

### 2.2.4 Type Plate

The device type is specified by the type plate (on the housing):

Example:

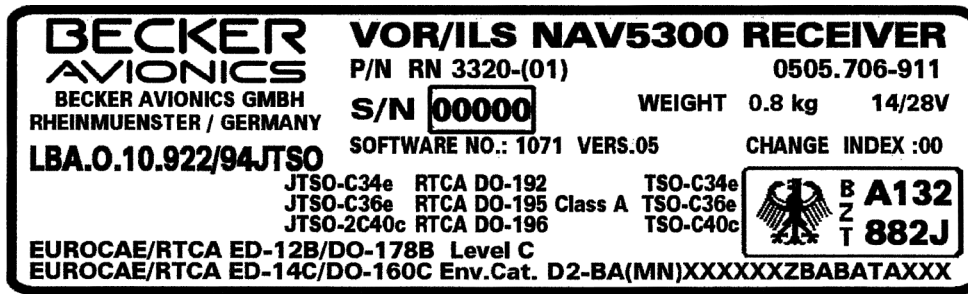


Figure 2: Type plate (example)

**Explanation:**

<b>P/N:</b>	<p><b>Example Type designation:</b>                  RN3320 = Remote-controlled navigation VOR/LOC + GS receiver                  RN3330 = Remote-controlled navigation VOR/LOC receiver</p> <p><b>Options:</b>                  -(01): inclusive Converter                  -(02): NAV composite only</p>
<b>S/N:</b>	Unique number (serial number) of the particular device
	<p><b>Change Index</b>                  Refer to the version on the device type plate</p>
	<p><b>Software</b>                  Refer to the version on the device type plate</p>
	<p><b>Compliance and Certifications</b>                  Refer to the text and logos on the device type plate</p>

### 2.2.5 Software/Firmware Status – Functionality

- The software version of new deliveries are subjects to change without notice.
- For detailed information about modifications you may contact our Customer Service Department.

## 2.3 Installation Requirements

The installation of the device(s) depends on the type of aircraft and its equipment and therefore only general information can be given in this section.

### SAFETY INSTRUCTIONS

The installation of RN33XX into an aircraft may be carried out by an authorized installation company. The country regulations always have to be obeyed.

- The device must not be opened.
- Keep enough distance to devices with integrated ventilator fans to make sure the free circulation of the cooling air.
- The installation area must have a minimum distance of 30 cm from the magnetic aircraft compass, to prevent any interference to the magnetic compass.
- Forced cooling is not required.

### SAFETY INSTRUCTIONS

The RN33XX is made for installation in the avionics compartment of fixed and rotary wing aircraft.

These limitations apply for the installation:

- The installation must be in accordance with the local aviation authority approved guidelines (e.g. EASA, FAA).
- The personnel installing this device must make sure that the aircraft installation conditions are in the ETSO/TSO standards applicable for the specified type or class of aircraft.
- The conditions and tests for ETSO/TSO approval of this article are minimum performance standards.
- The equipment is not qualified for installation in areas with fluid contamination.
- Changes or modifications made to this equipment not expressly approved in written form by Becker may void the authorization to operate this equipment.

### SAFETY INSTRUCTIONS

- Use only cables which are qualified for aircraft use (self-extinguishing).
- Use the recommended wiring diameters for power supply and for other cables (see "Aircraft Wiring" page 35).
- Fit sleeves over the solder joints on the equipment connector.
- HF cable should not be included in the cable harnesses.
- Use the recommended fuses in the power supply line for the protection of the application, see "Technical Data" page 19.

### ⚠ CAUTION

Examine the wiring carefully before power up the device(s) and examine particularly correct connection of the power supply lines.

### 2.3.1 Place of Installation

The RN33XX is made for installation in the avionics compartment.

Use the preinstalled mounting plate for installation to meet the conditions for DO-160, section 7, 8.

- Find an appropriated position for installation to make sure the easy access for potentiometer settings (see "Potentiometer for System Adjustment" page 40).
- Separate the mounting plate from RN33XX.
- First install the mounting plate with five appropriated screws.  
**Note: It is required to use all five mounting holes to tighten the mounting plate!**
- Slide-in the RN33XX into the mounting plate.
- Use the two quick-release studs (DZUS) to lock the device.

For details see "Environmental Condition", page 22 and "Dimensions, Fehler! Verweisquelle konnte nicht gefunden werden." page 30.

### 2.3.2 Mounting Distance

Dimensions mm (inch)

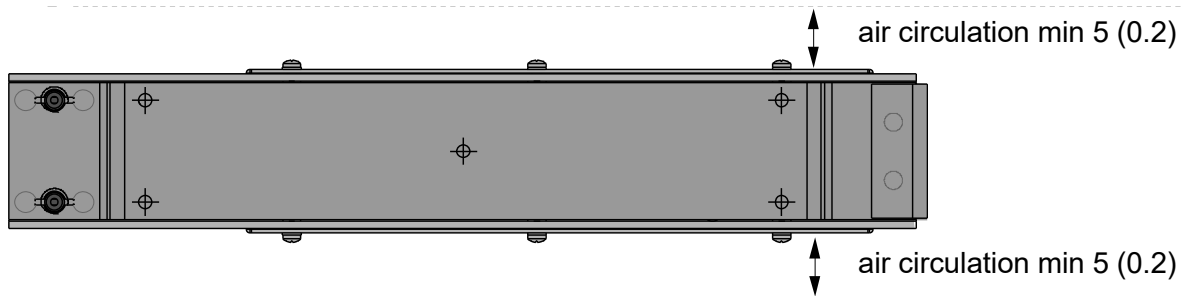


Figure 3: RN33XX with Mounting Plate - Mounting Area

### 2.3.3 Grounding

**SAFETY INSTRUCTIONS**

Make sure that the grounding contact area is adequate and that the connection has low resistance and low inductance. Never use a grounding point on paint-coated surfaces!

### 2.3.4 Antenna Cables

**NOTICE**

The total attenuation of each antenna connection, including cables, connectors, microwave switch (if used), etc. shall be as low as possible.

An aircraft installation should be verified for receiving sensitivity in accordance with ICAO Annex 10, Vol. 3, Part II, §2.3.2.2.1

Observe manufacturer data for characteristic attenuation of the selected cable type, connectors, microwave switch, etc.

### 2.3.5 Antenna Installation

For antenna installation, refer always to the manufacturer's maintenance documentation for the aircraft. Carry out the antenna installation in accordance with AC 43.13-2B Chapter 3.

**NOTICE**

Penetration of the pressurized cabin on a pressurized aircraft requires additional data, which are not contained in this installation manual.

**CAUTION**

Radiation risk:

A safe distance to the installed antenna must be ensured by related installation measures to prevent human body damage (e.g. at the eyes) and to prevent the inflammation of combustible materials by radiated energy.

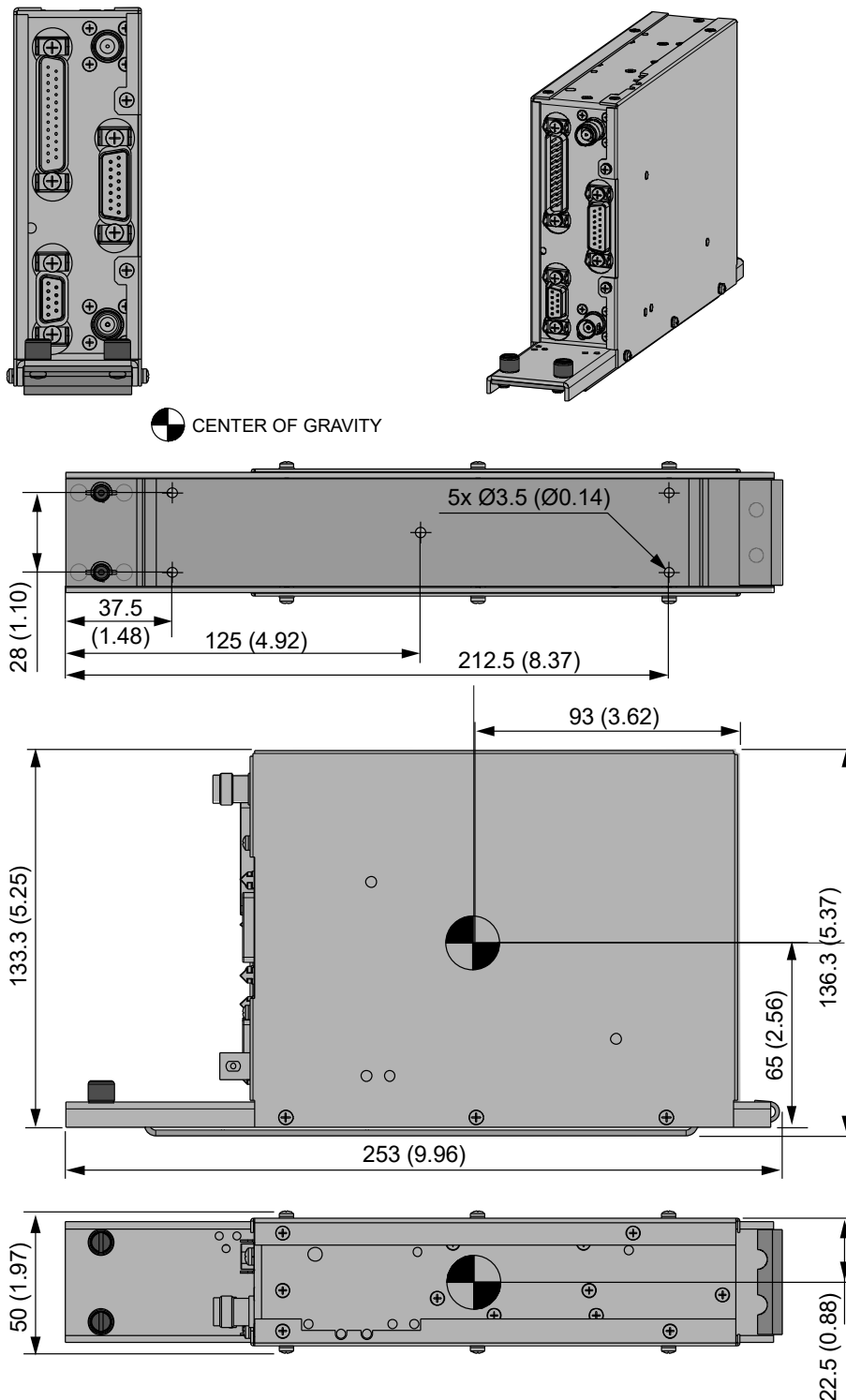
**NOTICE**

The aircraft's manual for antenna installation has to be obeyed.

## 2.4 Dimensions

### 2.4.1 RN33XX

Dimensions mm (inch)



Connector assignment depends on variant

Figure 4: RN33XX with Mounting Plate

Allowable deviation for dimensions without tolerances: DIN ISO 2768 T1 C (dimensions in mm)		
xx...6 (±0.3)	>30...120 (±0.8)	>400...1000 (±2.0)
>6...30 (±0.5)	>120...400 (±1.2)	>1000...2000 (±3.0)

2.4.2 Mounting Plate

Dimensions mm (inch)

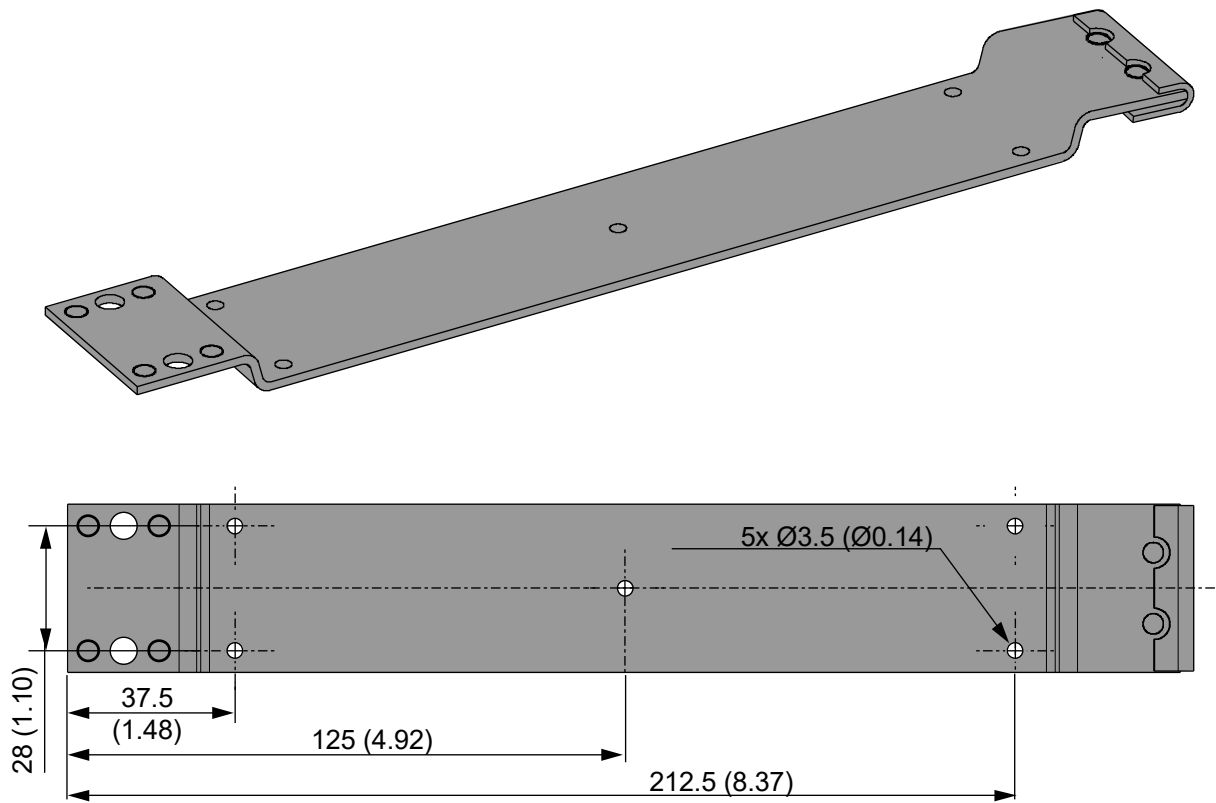


Figure 5: RN33XX - Dimensions

Allowable deviation for dimensions without tolerances: DIN ISO 2768 T1 C (dimensions in mm)		
xx...6 (±0.3)	>30...120 (±0.8)	>400...1000 (±2.0)
>6...30 (±0.5)	>120...400 (±1.2)	>1000...2000 (±3.0)

## 2.5 Connector Pin Assignments

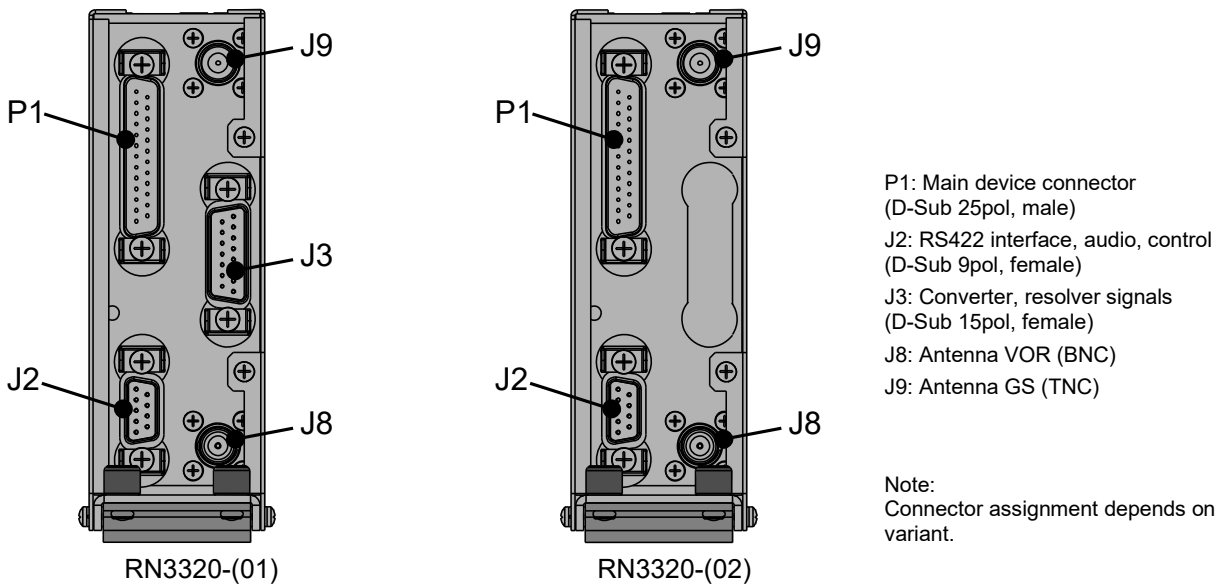


Figure 6: RN33XX – Connector Layout

### 2.5.1 Connector P1

P1 Pin	Name	Function
1	DME 100 kHz Steps E	
2	DME 100 kHz Steps D	
3	DME 100 kHz Steps C	
4	DME 100 kHz Steps B	
5	DME 100 kHz Steps A	
6	DME Ground	
7	TEST Extern	open collector, 30 V, max. 150 mA
8	Y-DME	50 kHz
9	N.C.	factory only
10	N.C.	factory only
11	Audio Out (HI)	150 mW (300 Ω)
12	Ground	-GS flag, ground connection
13	VOR/LOC Composite Out	
14	DME MHz Steps E	
15	DME MHz Steps D	
16	DME MHz Steps C	
17	DME MHz Steps B	
18	DME MHz Steps A	



P1 Pin	Name	Function
19	ILS-Mode	open collector, 30 V, max. 150 mA
20	+GS Pilot Up GS Super-Flag	
21	+GS Needle Up	
22	+GS Autopilot Down +GS Needle Down	
23	+GS Flag	
24	BATT. +14/28 V	
25	BATT. Switched	

### 2.5.2 Connector J2

J2 Pin	Name	Function
1	/ON	
2	RS422 RX-A	RS422 interface
3	RS422 RX-B	RS422 interface
4	DME 10 MHz Steps A	
5	Ground	GND, ground connection
6	RS422 TX-A	RS422 interface
7	RS422 TX-B	RS422 interface
8	GS Super-Flag Control	open collector, 30 V, max. 150 mA
9	Audio LO	

### 2.5.3 Connector J3 (depends on variant)

J3 Pin	Name	Function
1	Ground	GND, ground connection
2	N.C.	factory only
3	+FROM	
4	-VOR/LOC Flag	
5	+VOR/LOC Needle Right	
6	+VOR/LOC Autopilot Right	
7	+VOR/LOC Super Flag Control	open collector, 30 V, max. 150 mA
8	VOR Valid	without VOR signal: 0 V, (max. 100 mA) with VOR signal: 10 V, (R1 = 100 kΩ)
9	Resolver H	
10	Resolver C/E/G (= 5 V)	
11	+VOR/LOC Flag	
12	+TO	
13	+VOR/LOC Needle Left +VOR/LOC Autopilot Left	
14	Resolver D	
15	Resolver F	

### 2.5.4 Connector J8

Antenna connector VOR signals:

- Type: BNC

### 2.5.5 Connector J9

Antenna connector GS signals:

- Type: TNC

## 2.6 Aircraft Wiring

**SAFETY INSTRUCTIONS**

Installation of the device varies according to aircraft and equipment design. It is therefore only possible to provide general guidelines in this section.

### 2.6.1 Electrical Bonding and Grounding

**SAFETY INSTRUCTIONS**

- Make sure that the device is correctly connected to aircraft ground (structure).
- Make sure that the electrical continuity between the device and the structure is also achieved without removing the protective finish at the attachment points.
- Make sure that the electrical bonding area is adequately sealed or coated in order to avoid corrosion.
- Make sure that the resistance between the component which ensure equipment bonding and any point of this item of equipment do not exceed 20 mΩ.

#### 2.6.1.1 Connector Wiring - Cable Shield

- Connect cable shield to connectors metal hood.

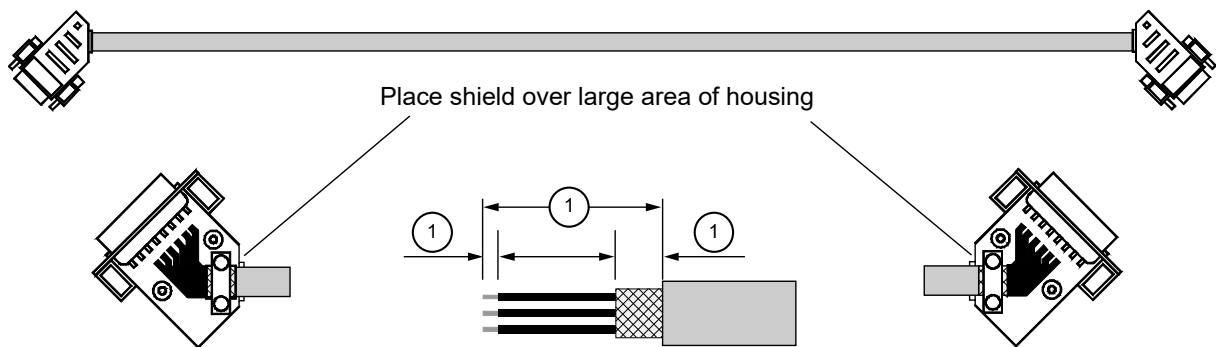


Figure 7: Connector Wiring - Cable Shield

① Stripping length depends on cable type.

2.6.2 Wiring – RN3320-(01), CU5301, IN3300

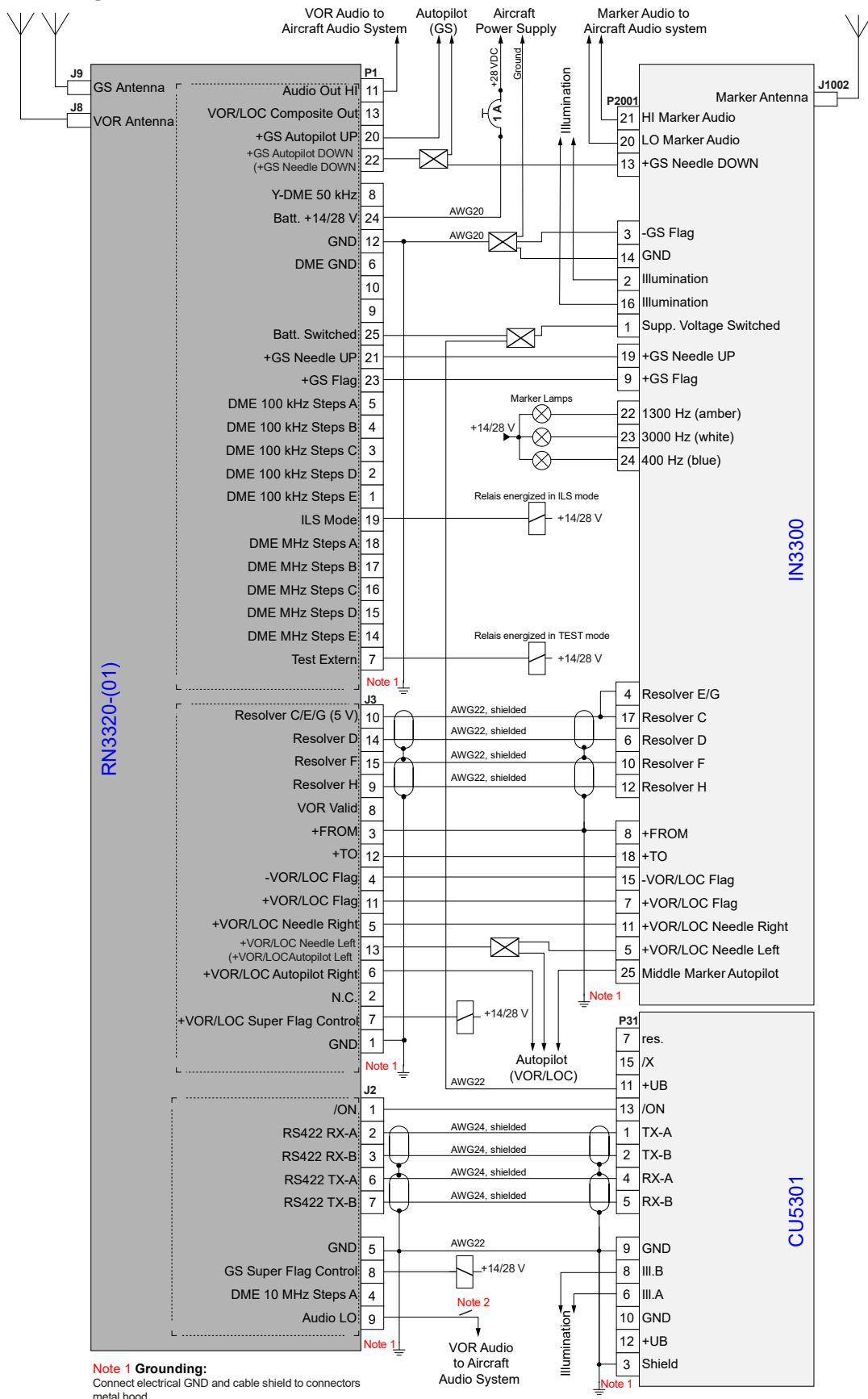


Figure 8: Wiring – RN3320-(01), CU5301, IN3300

2.6.3 Wiring – RN3320-(01), CU5301, IN3300-20

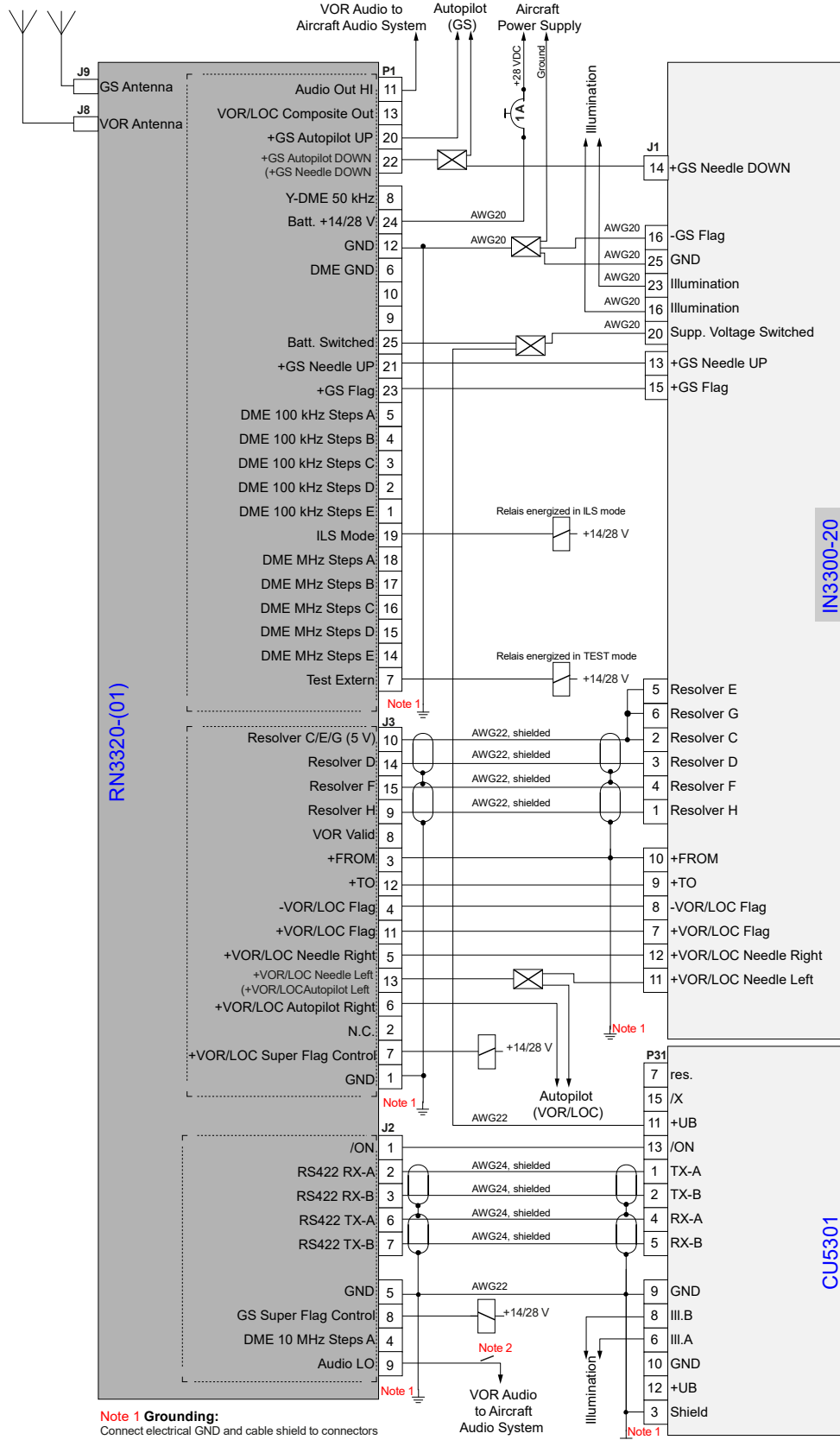


Figure 9: Wiring – RN3320-(01), CU5301, IN3300-20

2.6.4 Wiring – RN3330-(01), CU5301, IN3300

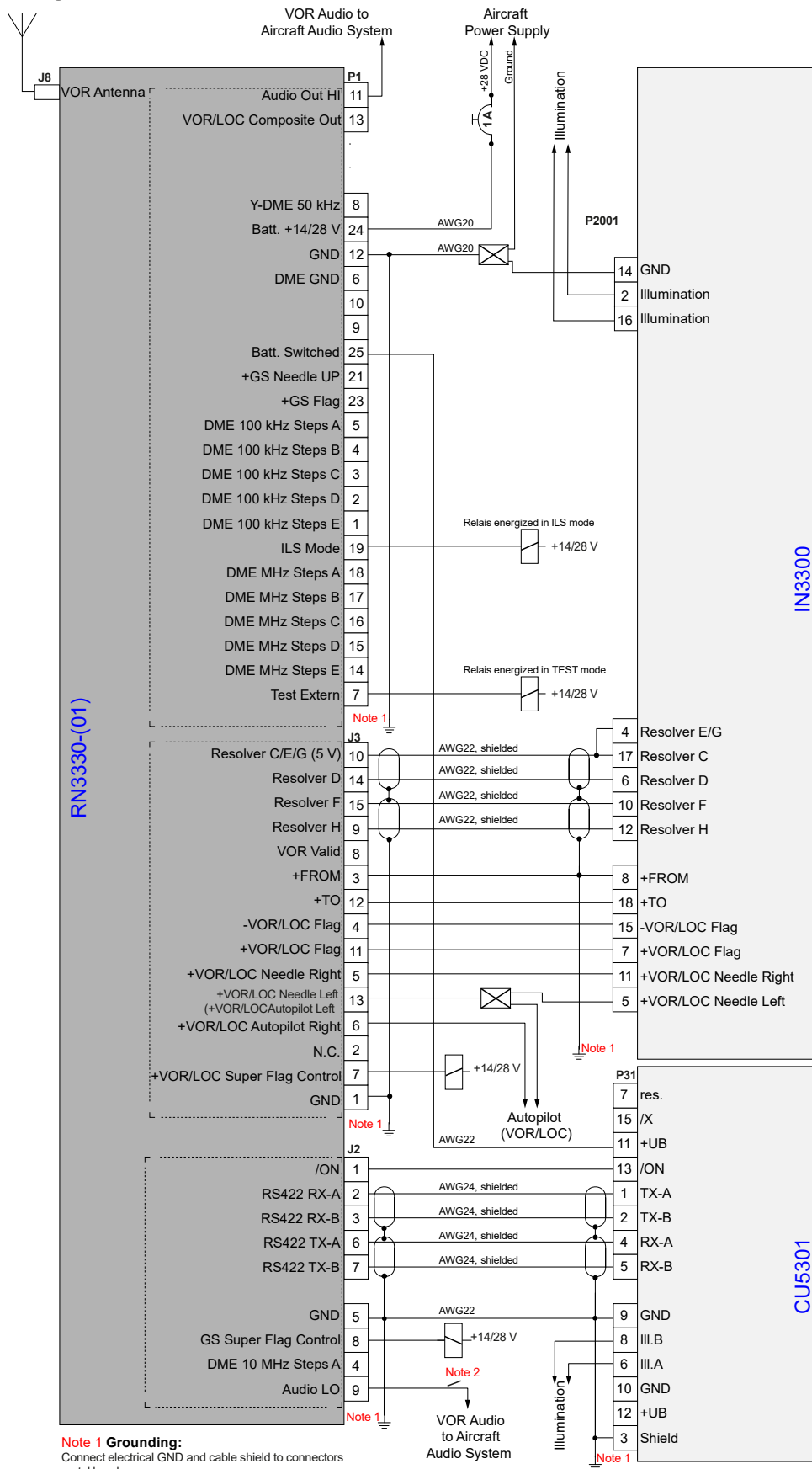


Figure 10: Wiring – RN3330-(01), CU5301, IN3300

## 2.7 Configuration

### 2.7.1 Connection of Additional Pointers and Flags

#### RN3320

It is possible to connect two supplementary instruments (1 k $\Omega$ ) parallel to the indicator without altering the receiver. For example, instruments with:

- VOR/LOC pointer
- VOR/LOC warning flag
- TO/FROM indication
- GS pointer
- GS warning flag

### 2.7.2 Connection of VOR/LOC and GS Super Flags

If it is necessary that the converted VOR/LOC and GS signals to be fed to the super flag input of a course guidance system, 2 relays must be installed, that are controlled by the super flag control outputs.

**Note:** According to ARINC 478/479:  
Course guidance systems require 27.5 VDC signals to indicate that the converted navigation signals are useable (reversing the warning flag function).

### 2.7.3 Remote Control of a DME Device

A DME device can be controlled via a navigation receiver RN33XX (examples see "Aircraft Wiring" page 35).

### 2.7.4 Connection of Audio Output

The audio output of the navigation receiver is set to a symmetrical audio output on delivery.

- A symmetrical selection system or head set can be connected.

#### 2.7.4.1 Asymmetric Wiring of the Audio Output (from serial no. 99)

To change the audio output from symmetric to asymmetric:

- Changes on circuit boards are required.  
Contact manufacturer for information.

#### 2.7.4.2 Asymmetric Wiring of the Audio Output (upwards serial no. 100)

To change the audio output from symmetric to asymmetric:

- Insert a wire jumper from J2/pin5 to J2/pin9.
- Remove the previous wiring at J2/pin9 to AS audio line.

### 2.7.5 Potentiometer for System Adjustment

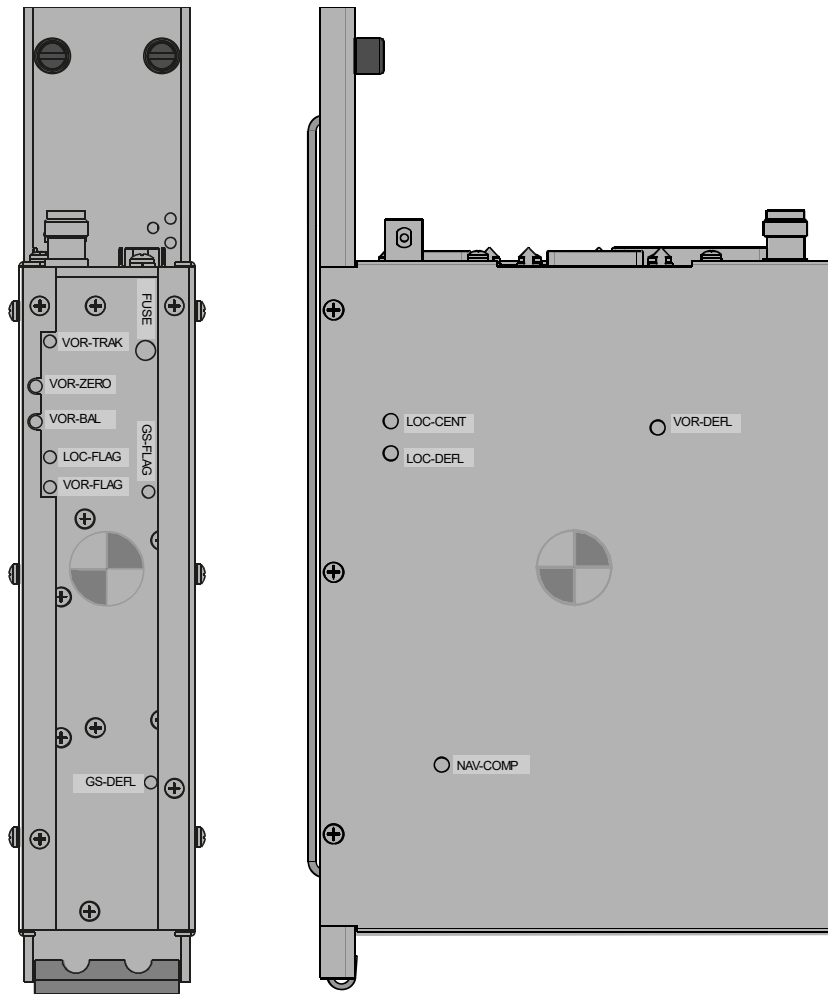


Figure 11: RN33XX – Potentiometer for System Adjustment

**SAFETY INSTRUCTIONS**

The adjustments are already set to factory values.

It is not necessary to set system modifications.

If there is a deviation from a specified value because of different equipment in the application, follow the instructions described in this manual for the correction work.



## 2.8 Post Installation Check

After the device/system is installed completely do a test. Make sure that the compliance with the authority required procedures is obeyed.

The description that follows gives guidance for such tests.

### 2.8.1 Mechanical Installation and Wiring Check

- Verify all cables are securely fixed and shields connected properly to signal ground.
- Check the movement of aircraft controls to verify there is no interference.
- Verify all screws are tight, check if all connections are mechanically secured.

### 2.8.2 Power Supply

- Check the power supply lines and confirm correct polarity. Don't apply reverse voltage!
- Confirm that the aircraft power supply is within the specified limits, with and without a running engine.

### 2.8.3 Internal Navigation Receiver Functions

- Switch on the navigation system at the control device.
  - The last frequencies used are shown in the displays after the power on reset.
  - The mode selected before power off is also active.
  - In the channel mode it must be possible to store the channel frequencies.
- Press the TEST button.
  - The digits 188.88 should flash on and off (display test).
  - During display test, the VOR/LOC pointer of the indicator should swing all the way out and the VOR/LOC warning flag should disappear.
  - In navigation receiver with GS functionality the GS pointer of the indicator should also deflect fully and the GS warning flag should disappear.

### 2.8.4 VOR System Functions

- Connect the RF output of the VOR/LOC signal generator to a suitable VOR antenna.
  - The distance between the antenna and the aircraft should be approximately 20 m.
  - Set the standard VOR test signal to 330° FROM.
  - Set the RF output attenuator to 50 mV, test frequency 114.9 MHz.
- Set a 114.9 MHz frequency on the control device.
- Using the OBS dial on the indicator, set a course of 330° (upper scale marking "t").
  - The vertical needle is centered.  
If not, an additional adjustment is required.

#### NOTICE

##### VOR zero adjustment:

- Correct the adjustment - needle centered - with potentiometer VOR-ZERO (please see "Potentiometer for System Adjustment" page 40).
  - After successful adjustment go on with the next step of the check list.
- Is the adjustment - needle centered - not successful:
  - Check installation and devices for other failures.
- The VOR/LOC warning flag disappears.
- The TO/FROM indicator should indicate FROM.
- Set the VOR AF generator to 150°.
  - The vertical needle should not deviate from center position by more than  $\pm 2^\circ$  and the TO/FROM indicator should indicate TO.
- Using the OBS dial, vary the course bearing by 10°.
  - The vertical needle should indicate full deflection (5 points).

### 2.8.5 LOC System Functions

- Set the VOR/LOC signal generator to 110.9 MHz and 50 mV with the standard LOC centering signal.
- Set a 110.9 MHz frequency on the control device.
  - The vertical needle should be centered.
  - The VOR/LOC warning flag should disappear.
- When the transmitter is set to standard LOC deviation signal, the vertical needle should deflect 3 points in the corresponding direction.

### 2.8.6 GS System Functions

- Connect the GS signal generator to a suitable GS antenna.
- Set a 108.95 MHz frequency on the control device (this corresponds to GS frequency 329.15 MHz).
- Set the signal generator to 329.15 MHz and RF output level of 50 mV.
- Set the standard glideslope centering signal.
  - The horizontal needle on the indicator should remain centered.
  - The GS-flag should remain out of sight.
- Set the GS-deviation signal for "down".
  - The horizontal needle should deflect down while the GS-flag stays out of sight.
- Set the GS-deviation signal for "up".
  - The horizontal needle should deflect up while the GS-flag stays out of sight.

### 2.8.7 Antenna Check

- Check the VSWR (voltage standing wave ratio) over the complete frequency band (e.g. by using a VHF Reflection-Coefficient Meter).  
The VSWR ratio should be less than 2:1 and is not acceptable when exceeding 3:1.

### 2.8.8 Interference Check

- Check the device/system while engine is running and powered on all other avionics/ electrical systems on the aircraft, to verify that no significant interference exists.
- Check also that the device/system does not cause significant interference with other systems.

The installer's standard test procedure may be used for the interference check and the following table can be taken as a reference. Depending on the individual avionic systems installed in the aircraft, it might be necessary to extend the following checklist accordingly.

Aircraft System Checklist	Function	
	OK	NOT OK
DME		
Audio		
Generators / Inverters		
GPS System		
Compass 1		
ADF		
VHF / NAV1 all channels		
VHF / NAV 2 all channels		
Marker Receiver		
Motor(s)		
Engine Instruments		
Storm scope		
Transponder		
Air Data Computer		
Autopilot and Servos		

For the remaining avionic equipment repeat all interference checks during a flight and include all equipment not previously checked out on ground. A communication performance check in the low, mid and high frequency band of the device should be included.

- Verify the receiver output produces a clear and understandable audio output.

## 2.9 Error / Failure Indication

It is possible to read out and reset error flag. Details see: "Read Out and Reset Error/Failure Flags" page 46.

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### 3 Operation

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#### 3.1 General

This section contains general information and instructions for safe operation.

#### 3.2 Device Description

The navigation receivers RN3320-(XX and RN3330-(XX) are remote controlled devices, which does not include a control panel. The navigation receivers can receive commands and send data through a set of interfaces.

For a list of associated devices for operating please see "Associated Devices" page 13 .

##### 3.2.1 Device Assignment

This manual is valid for the following devices:

- See page 26

#### 3.3 Start-Up

##### 3.3.1 Self-Test

The self-test of the navigation receiver can be initiated by the user.

- With the TEST function via a control device a functional check will be started.
- The VOR/LOC evaluation and GS evaluation will be checked.

### 3.4 Operation with Becker Avionics Controller

For detailed information refer to the manual CU5301 Installation and Operation DV60511.03 (Article No. 0511.455 -071).

### 3.5 Operation with Becker Avionics RMU5000

For detailed information refer to the manual RMU5000 Installation and Operation DV64301.03 (Article-No. 0541.958-071).

### 3.6 Operation with OEM Controller / Glass Cockpit

For detailed information refer to the manual of the respective OEM product.

### 3.7 RS422 Protocol supported by RN33XX

Detailed information on request.

For relevant department and addresses, please see contact info page 2.

### 3.8 Read Out and Reset Error/Failure Flags

It is possible to read out and reset error flags.

This can be done by the connected OEM product, for detailed information please refer to the manual of the respective connected OEM product.

For a list of associated devices for operating please see "Associated Devices" page 13 .

### 3.9 Warning and Failure Indications

Display Contents	Description
Device does not switch on	<ul style="list-style-type: none"> <li>• Check cable.</li> <li>• Check power supply.</li> </ul>
Other failures	Contact maintenance shop for assistance.

### 3.10 Contact Data

In case of additional questions contact your local Becker Avionics dealer or forward your request direct to Becker Avionics "Customer Service".

In the event of damage or a defect, the entire device must be returned for repair. The repair must be done by trained Becker Avionics personnel.

**For department and addresses, please see contact info page 2.**

**Any change by the user excludes any liability on our part (excluding the work described in this manual).**

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We reserve the right to make technical changes.  
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**\*\*\* End of the Document \*\*\***