RMILEC®

RMILEC 4047NB20 V2
USER MANUAL

20-Channel UHF Long-Range Control System

RMILEC®

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1. Product Introduction

RMILEC NB20 V2 (4047NB20) is a next-generation UHF Long Range System designed for professional RC pilots, UAV manufacturers and system integrators. Instead of being just another "long-range module", it acts as a dedicated command backbone that coexists with HD video links and autopilot systems.

With up to 5W RF output, high receiver sensitivity and intelligent control logic, RMILEC 4047NB20 delivers a predictable, debuggable and repeatable control link in environments where conventional 2.4GHz systems quickly reach their limits. Compared with earlier NB20 generations, the V2 edition features:

- Redesigned RF architecture with improved sensitivity (≈ –115 dBm)
- Higher stability across 400–470 MHz operating band
- Optimized narrowband modulation improving link margin
- New menu structure with real-time diagnostics
- Faster binding and improved pairing security
- Updated cooling system for high-power operations (up to 5W)
- Enhanced electromagnetic noise filtering

NB20 V2 is commonly deployed in:

- Fixed-wing UAV platforms (long-range + high endurance)
- VTOL drones (hybrid flight control compatibility)
- Multirotors requiring robust command link backup
- UAVs flying in interference-dense areas
- Industrial robots requiring stable remote actuation

Its primary strength: maintaining stable command link in conditions where 2.4 GHz becomes unreliable due to multipath, noise, or long-distance attenuation.

2. Key Features

RF PERFORMANCE

• Operating band: 400–470 MHz (programmable)

• Preset working channels: 433 / 435 / 445 / 455 MHz

• RF power levels: 0.5W / 1W / 2W / 5W selectable

• Modulation: Narrowband high-resilience modulation

• Sensitivity: approx. –115 dBm

• Dual-antenna diversity reception

SYSTEM ARCHITECTURE

• 20-channel receiver with SBUS/PPM outputs

• High-stability local oscillator

• Automatic gain optimization

• Hardware watchdog & failsafe logic

MECHANICAL & COOLING

• High-efficiency internal cooling fan

• Ventilated aluminum casing

• Rugged SMA antenna connector

USER INTERFACE

• LCD UI with fast response

• Clear multi-level menus

• Signal Analyzer with RSSI / Noise / Link Margin

• Real-time servo monitor for debugging

3. System Overview

NB20 V2 consists of three core components:

1. T4047NB20 Transmitter Module
2. R4047NB20 Narrowband Receiver
3. Dual-antenna Diversity System

T4047NB20 TRANSMITTER

- Accepts PPM1 / PPM2 / SBUS as input
- Converts signal to UHF narrowband transmission
- Adjustable frequency & RF power
- Built-in fan for thermal protection

R4047NB20 RECEIVER

- Outputs SBUS or PPM
- Supports up to 20 independent channels
- Dual-antenna diversity algorithm
- Fast response failsafe output

USE CASE WORKFLOW

RC Radio → NB20 TX Module → UHF Link → NB20 Receiver → SBUS/PPM → Flight Controller / Servos

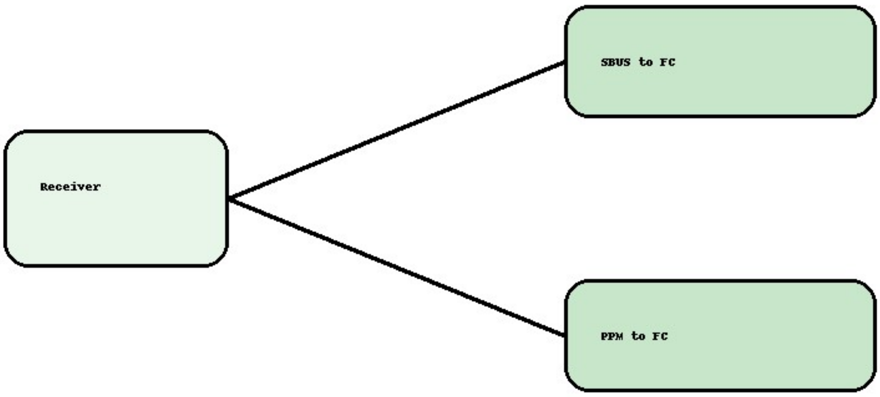
4. Safety Information

- Do not operate transmitter without antenna installed. RF stage may be damaged.
- Ensure antenna connector is firmly tightened.
- Always verify legal UHF frequencies in your country.
- Maintain clear airflow path around transmitter fan.
- Perform range test after any frequency/power change.
- Place receiver antennas away from carbon fiber & power wires.
- Use only regulated 5V BEC for receiver power.

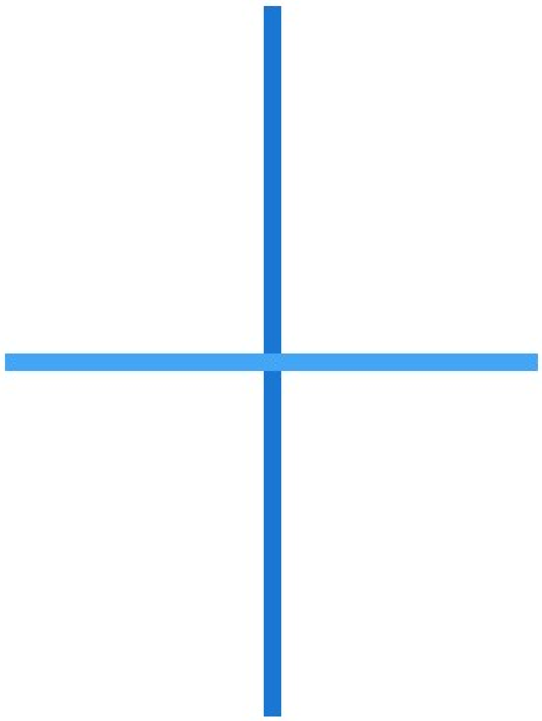
5. System Diagrams

5.1 System Block Diagram

5.2 Receiver Wiring Diagram



5.3 Recommended Antenna Orientation

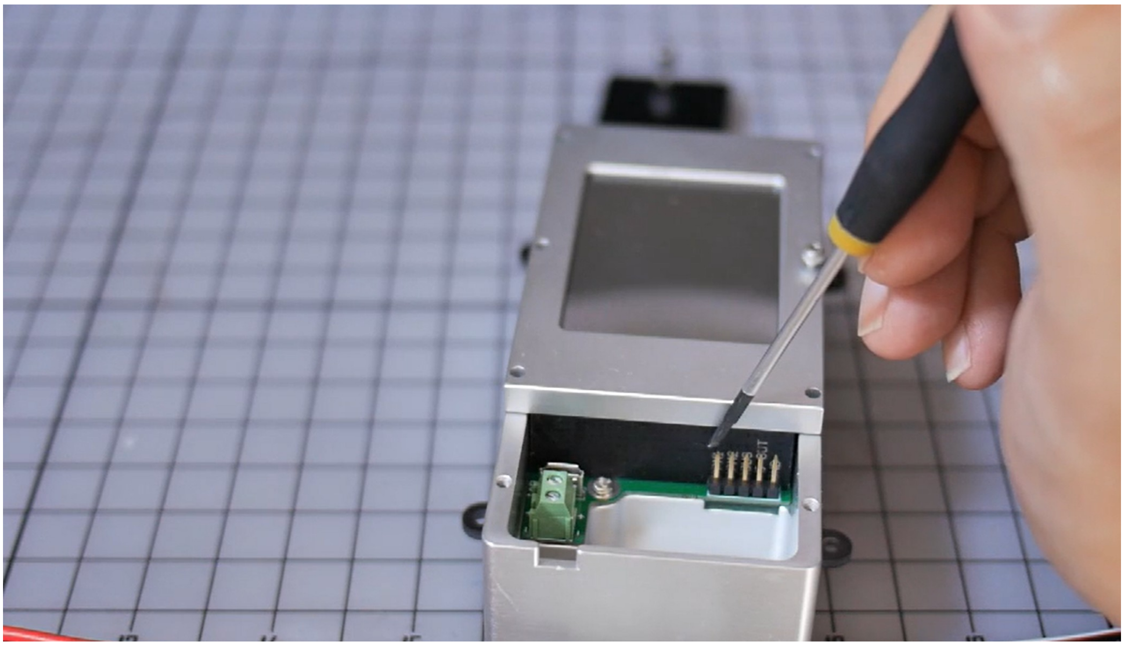


Recommended 90° Orientation

6. Installation Guide

TRANSMITTER MODULE INSTALLATION

1. Insert module into RC transmitter bay securely.
2. Connect PPM/SBUS cable to module input.
3. Install UHF antenna tightly onto SMA port.
4. Power on RC radio → Verify module splash screen.



From the left: PPM2, PPM1, SBUS, 5V Output, GND

RECEIVER INSTALLATION

1. Mount receiver using vibration-absorbing foam.

2. Separate antennas by at least 90 degrees (critical).

3. Route antennas away from ESC, battery leads, and carbon plates.

4. Connect SBUS OUT → Flight Controller SBUS IN.

5. Power with regulated 5.0V BEC.

ANTENNA ORIENTATION RULES

• Keep both antennas away from ground plane.

• Minimum separation: 12–18 cm

• Avoid full carbon fuselage blockage

• Position antennas outside fuselage when possible

7. Binding Procedure

1. Power on transmitter module.
2. Press MENU → Select “Bind”.
3. Highlight “Bind Start” (do NOT confirm yet).
4. Power off receiver.
5. Hold RX Bind/Set button.
6. Power on receiver → LED fast-flashes (Bind Mode).
7. Press OK on transmitter to start binding.
8. RX LED becomes solid = successful bind.

If binding fails:

• Reduce distance to < 1m

• Remove obstacles

• Ensure frequency region supports pairing

8. Input Conversion (PPM / SBUS)

SUPPORTED INPUTS

• PPM1

• PPM2

• SBUS

STEPS

1. MENU → Input Setting
2. Select desired input mode

PPM SETTINGS

- PPM Normal
- PPM + Failsafe (recommended for fixed-wing)

CHANNEL MONITORING

1. MENU → Servo Monitor
2. Move sticks → Verify mapping

9. RF & Frequency Settings

PRESET CHANNELS

- 433 MHz
- 435 MHz
- 445 MHz
- 455 MHz

CUSTOM FREQUENCY MODE

1. MENU → RF Setting
2. Select Custom → Enter any value 400–470 MHz

RF POWER LEVELS

- 0.5W – indoor / test
- 1W – short-range use
- 2W – medium-range
- 5W – long-range operations

FIRMWARE REGION LOCKS

• Some channels may be automatically restricted

• Restrictions depend on regional compliance

10. Firmware Upgrade

1. Power off NB20 module.
2. Connect USB cable to PC.
3. Launch RMILEC Upgrade Tool.
4. Select detected COM port.
5. Click 'Open File' → Select firmware (.bin).
6. Click 'Upgrade' → Wait for progress bar.
7. “Upgrade Completed” message appears.
8. Disconnect USB → Reboot module.

11. Signal Analyzer

NB20 V2 includes a real-time RF analyzer showing:

• RSSI Strength

• Noise Level

• Link Margin

• Packet Stability

• Frequency validity

USE CASES

• Diagnose interference

• Compare antenna positions

• Evaluate flight-range safety

12. Troubleshooting

ISSUE: No signal

CAUSE: Not bound

FIX: Re-bind, check antennas

ISSUE: Short range

CAUSE: Bad antenna placement

FIX: Reposition + increase power

ISSUE: Overheating

CAUSE: Poor airflow

FIX: Improve cooling

ISSUE: Servo jitter

CAUSE: Poor BEC

FIX: Use stable 5V supply

13. Technical Specifications

TRANSMITTER T4047NB20

• Frequency: 400–470 MHz

• RF Power: 0.5W / 1W / 2W / 5W

• Input: PPM1 / PPM2 / SBUS

• Cooling: Active fan

• Display: LCD

RECEIVER R4047NB20

• Sensitivity: –115 dBm typ

• Output: SBUS / PPM

• Dual Antenna

• Power Input: 5.0V

14. Regulatory & Certification

NB20 V2 firmware includes region-based channel restrictions.

Users must follow local UHF usage regulations.

15. Support & Contact

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Video Tutorials: https://www.youtube.com/@airmobi/videos