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INSPIRED FLIGHT

# Long Range Telemetry Modem Configuration

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# Supplement

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## Safety Information and Notes

Inspired Flight Technologies products are high-performance systems, engineered for safe use. Where appropriate, this supplement alerts the user to specific actions necessary for safe operation of the aircraft.

The following symbols are used:

Symbol	Meaning
	General alert to an action or condition that may affect the safe operation of the equipment.
	Indicates a hazardous situation that, if not avoided, can result in death or serious injury.
	Indicates hazards or unsafe practices which could result in severe personal injury or death
	Indicates hazards or unsafe practices which could result in minor personal injury or equipment damage.

<b>NOTE</b>	Offers important information about a topic.
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## Purpose of this Supplement

The RFD900x-US telemetry radio is used with the Long Range Telemetry (LRT) versions of the IF750 and IF1200. This supplement describes how to do the following with the RFD900x-US telemetry radio:

- Eliminate interference with other radios by changing some parameters.
- Select an AES encryption level to protect classified data.

For an overview of the LRT version and its components, refer to the applicable sections of IF750 and IF1200 User Manuals.

### **Overview of the RFD900x Modem**

Compact radio modem designed and built by RFDesigns for use in aircraft control and telemetry

Frequency Range: 902-928 MHz

Air Data Rate: 4-750kbps

Weight: 14 grams

Dimensions: 30mm x 57mm x 12.8mm

LOS Range: ~40km depending on settings and antenna configuration

## Function of the RFD900x-US Telemetry Radios

Two RFD900s are used in LRT systems. They are set up as a pair, and function as follows:

- One RFD900 is the “Air Unit.” It resides in the aircraft.
- The other RFD900 is the “Ground Unit.” It connects to the device (laptop or tablet) that functions as the ground station, and typically has QGroundControl installed.

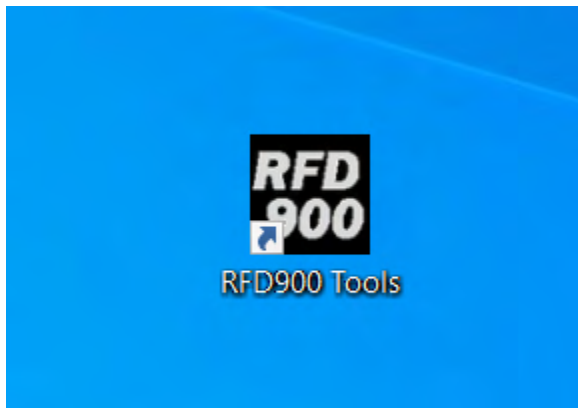
Once paired and synchronized with each other, the two units provide for long range, two-way communication and control of the aircraft.

## Eliminate Interference with Other Radios

This section describes how to configure the RFD900x-US radio modem so that it doesn't interfere, and is not susceptible to, interference from other radios.

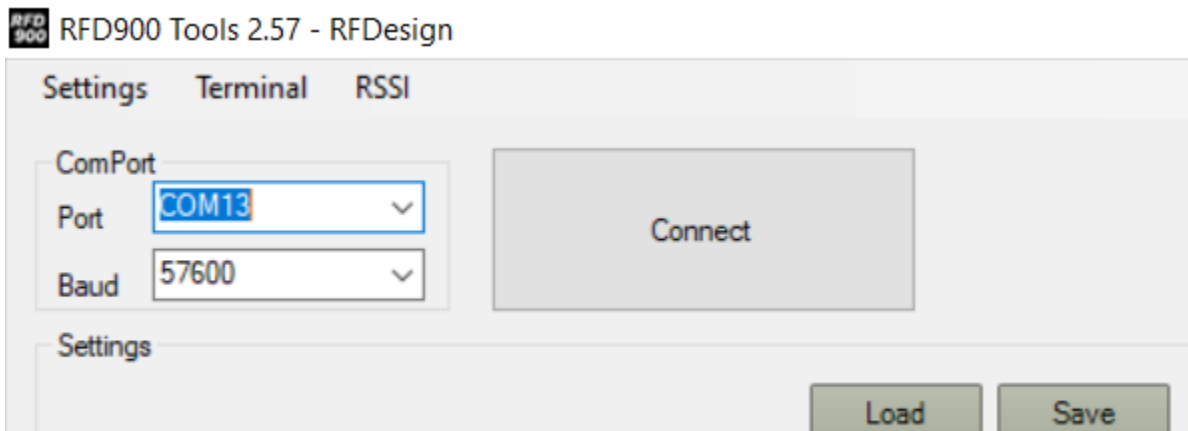
### Required Tools and Materials

Computer that has at least two USB ports, and has the RFD Tools application installed. To download the RFD Tools application, go to: <https://files.rfdesign.com.au/tools/>

Step	Action
1	Launch RFD900 tools application (see screenshot below).
	
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## Eliminate Interference with Other Radios, Continued

Step	Action
2	Plug both the air and ground modems into the USB ports on the computer using the included FTDI cables. Ensure the modems have their antennas attached before applying power.
3	Select the appropriate ComPort from the drop down menu on the GUI (see below), and verify the Baud rate is set to 57600. Once verified, click on the Connect button.

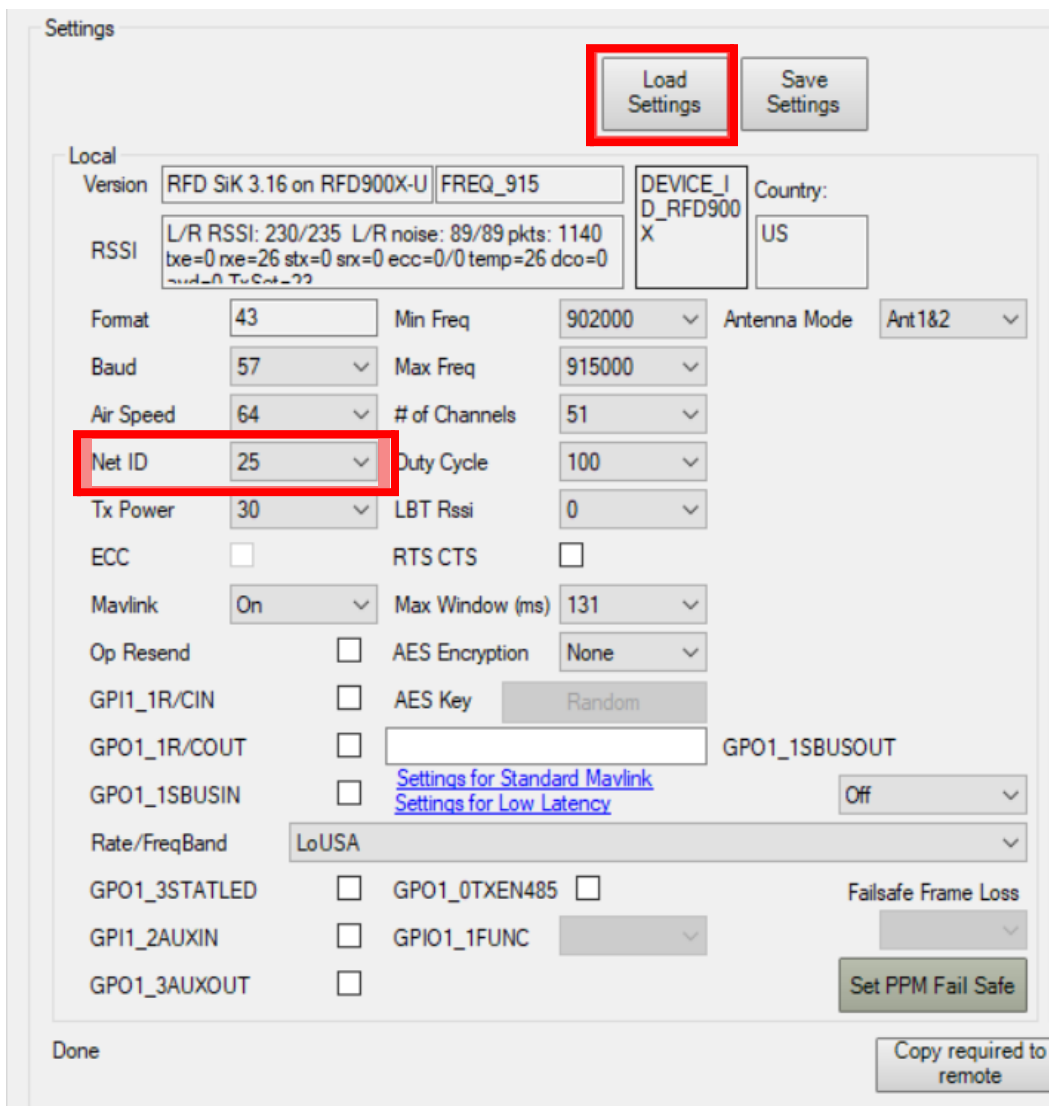


The screenshot shows the RFD900 Tools 2.57 - RFDesign GUI. The 'Settings' tab is selected. The 'ComPort' dropdown menu is open, showing 'COM13' selected. The 'Baud' rate is set to '57600'. A 'Connect' button is visible. At the bottom, there are 'Load' and 'Save' buttons.

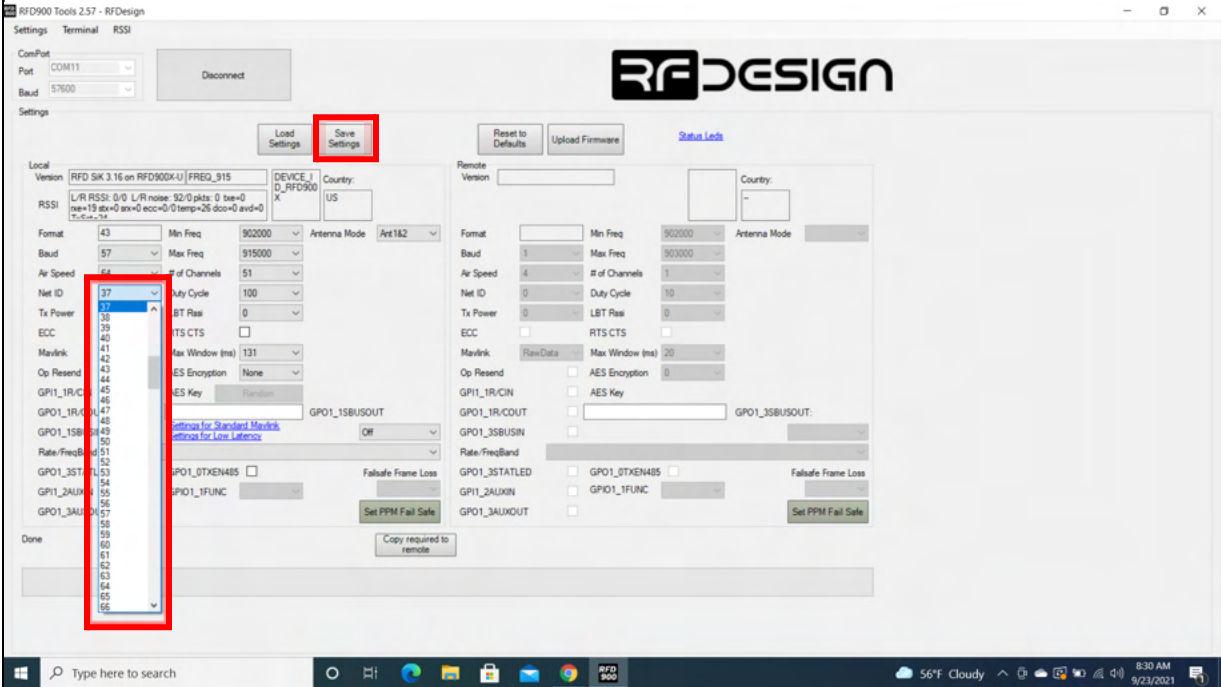
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## Eliminate Interference with Other Radios, Continued

Step	Action
4	<p>When the Connect button changes to “Disconnect”, the computer is connected to the device. Select Load Settings (see red border below), to populate the GUI with the device's internal parameters.</p> <p><b>Note:</b> If done correctly you should see the default settings of the device. The default NetID is 25 (see red border below). If this is not 25 then this modem may have already been configured.</p>
	 <p>The screenshot shows the 'Settings' window of the IFT LRT Modem Configuration software. At the top right, there are two buttons: 'Load Settings' and 'Save Settings'. The 'Load Settings' button is highlighted with a red rectangular border. Below these buttons, the 'Local' section contains various configuration fields. The 'Net ID' field, which is a dropdown menu, is also highlighted with a red rectangular border and currently displays the value '25'. Other visible fields include 'Version' (RFD SiK 3.16 on RFD900X-U), 'FREQ_915', 'DEVICE_ID_RFD900X', 'Country' (US), 'RSSI' (L/R RSSI: 230/235, L/R noise: 89/89 pkts: 1140, bxe=0 rxe=26 stx=0 srx=0 ecc=0/0 temp=26 dco=0), 'Format' (43), 'Min Freq' (902000), 'Antenna Mode' (Ant1&amp;2), 'Baud' (57), 'Max Freq' (915000), 'Air Speed' (64), '# of Channels' (51), 'Duty Cycle' (100), 'Tx Power' (30), 'LBT Rssi' (0), 'ECC' (unchecked), 'RTS CTS' (unchecked), 'Mavlink' (On), 'Max Window (ms)' (131), 'Op Resend' (unchecked), 'AES Encryption' (None), 'GPI1_1R/CIN' (unchecked), 'AES Key' (Random), 'GPO1_1R/COUT' (unchecked), 'GPO1_1SBUSIN' (unchecked), 'Settings for Standard Mavlink' (link), 'Settings for Low Latency' (link), 'Rate/FreqBand' (LoUSA), 'GPO1_3STATLED' (unchecked), 'GPO1_0TXEN485' (unchecked), 'GPI1_2AUXIN' (unchecked), 'GPIO1_1FUNC' (dropdown), 'GPO1_3AUXOUT' (unchecked), 'GPO1_1SBUSOUT' (Off), 'Failsafe Frame Loss' (dropdown), 'Set PPM Fail Safe' (button), 'Done' (button), and 'Copy required to remote' (button).</p>
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## Eliminate Interference with Other Radios, Continued

Step	Action
5	Under the NetID dropdown (see red border, below), select a unique ID. These range from 01-255. If you have multiple LRT aircraft, ensure that there is no conflict between existing aircraft.
	
6	Select Save Settings (see red border above) to save any changes made to the device.
7	Once the save is successful, select "Disconnect" so you can configure the other modem. Repeat Steps 3 through 6 for the other device. It will show up under a different ComPort in the dropdown menu.
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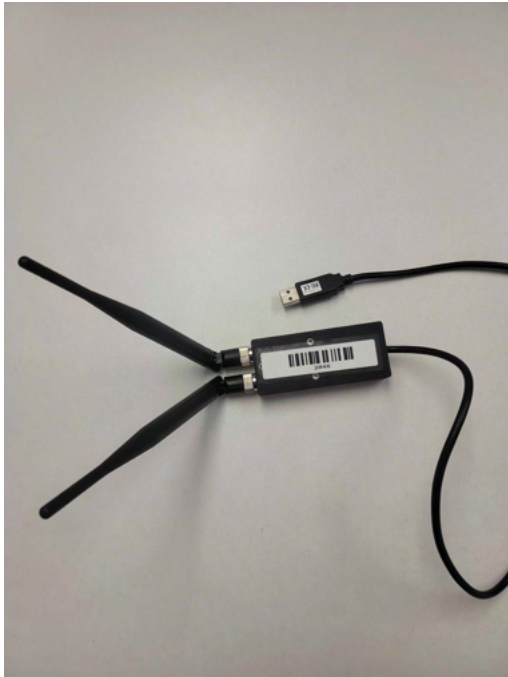
# Eliminate Interference with Other Radios, Continued

Step	Action
8	After both units have been configured, select "Load Settings" (see red border below). Both devices should populate the GUI with the same NetID. The modems also have an LED indicator that will change from flashing green to solid green once a link is established.

The screenshot shows the RFD900 Tools 2.57 - RFDesign software interface. The 'Settings' tab is active, displaying configuration options for a local RFD SK 3.16 on RFD900X-U. The 'Load Settings' button is highlighted with a red border. The interface includes fields for ComPort, Port, Baud, and various radio parameters like Format, Baud, Air Speed, Net ID, Tx Power, ECC, and GPIO settings. The 'Remote' section is also visible, showing similar configuration options for a remote device.

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## Eliminate Interference with Other Radios, Continued

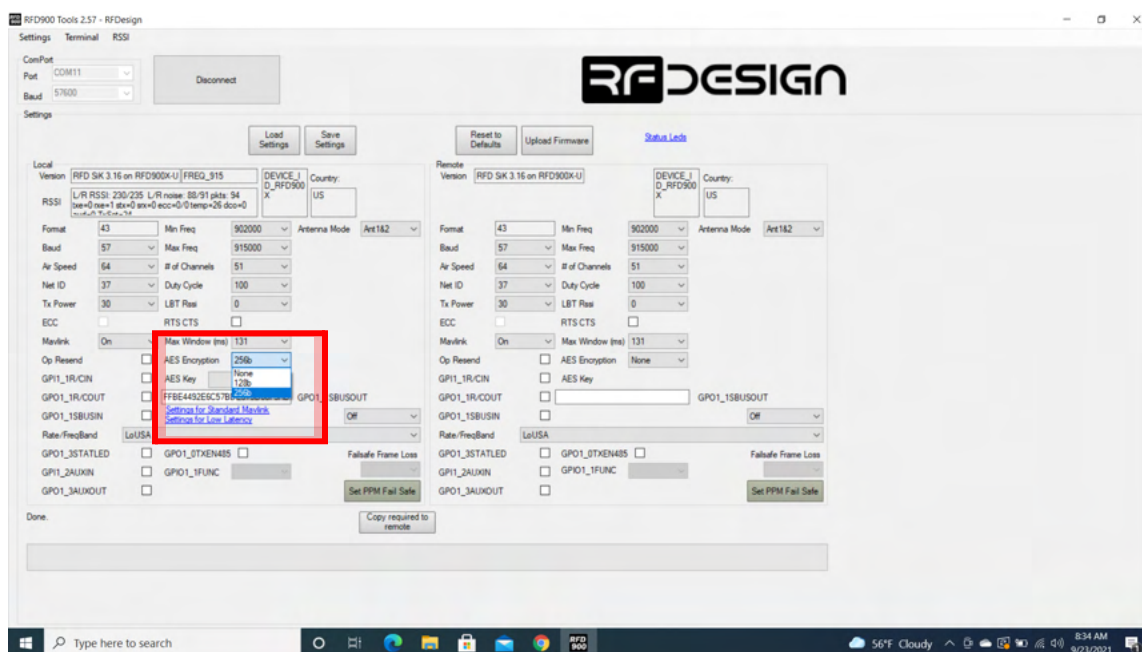
Step	Action
9	Once the devices have been paired successfully, disconnect the FTDI cables from the usb ports and “bag & tag” the units together.
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End of Procedure	

## Select an AES Encryption Level

The Advanced Encryption Standard (AES) is a symmetric block cipher chosen by the U.S. government to protect classified information. The RFD900x-US is capable of both 128b and 256b encryption.

The following procedure describes how to select an AES encryption type.

Step	Action
1	Repeat steps 1 through 4 from the previous procedure. If the devices have already been paired, they will both appear in the GUI (see below).
2	Under the AES Encryption dropdown (see red border below), select the desired encryption level. A randomly generated AES key will be created and assigned to the device.



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## Select an AES Encryption Level, Continued

Step	Action
3	In order to load the AES key on the other modem, select “Copy required to remote” (see red border near bottom, below), and the key will be shared with the other device.
4	Press “Save Settings” (see red border area near top, below), and disconnect the devices once they have been saved successfully.

The screenshot displays the RFD900 Tools 2.57 - RFDesign software interface. The 'Save Settings' button is highlighted with a red border. Below the settings, the 'Copy required to remote' button is also highlighted with a red border. The interface shows various configuration options for Local and Remote devices, including Version, RSSI, Format, Baud, Air Speed, Net ID, Tx Power, ECC, Mavlink, Op Resend, GP11\_1R/CIN, GP01\_1R/COU, GP01\_1S/USIN, Rate/FreqBand, GP01\_3STATLED, GP11\_2AUXIN, GP01\_3AUXOUT, and False Frame Loss.

**End of Procedure**

## Revisions

Revision Number	Changes
2.0	<ul style="list-style-type: none"><li>• Reformatted to be consistent with other customer docs.</li><li>• Changed photo on page 9 to show modem with long antennae.</li><li>• Removed photo under Step 2 on page 4.</li></ul>