RFX-NLL-II (NON-LICENSED LINK)

OPERATOR'S MANUAL

Need help? Contact RF extreme care Technical Support:

866.732.0113
(866.RFC.0113)

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1 GENERAL SAFETY INFORMATION

The information that follows, together with local site regulations, should be studied by personnel concerned with the operation or maintenance of the equipment, to ensure awareness of potential hazards.

WARNING- RF Power Hazard: High levels of RF power are present in the unit. Exposure to RF or microwave power can cause burns and may be harmful to health.

Switch off supplies before removing covers or disconnecting any RF cables, and before inspecting damaged cables or antennas.

Avoid standing in front of high gain antennas (such as a dish) and never look into the open end of a waveguide or cable where RF power may be present.

Users are strongly recommended to return any equipment that requires RF servicing to RF Central.

WARNING- GaAs / BeO Hazard: Certain components inside the equipment contain Gallium Arsenide and Beryllium Oxide that are **toxic substances.** Whilst safe to handle under normal circumstances, individual components **must not** be cut, broken apart, incinerated, or chemically processed. In the case of Beryllium Oxide, a white ceramic material, the principal hazard is from the dust or fumes which are carcinogenic if ingested, inhaled, or entering damaged skin.

Please consult your local authority before disposing of these components.

CAUTION - Tantalum Capacitors: When subjected to reverse or excess forward voltage, ripple current or temperature these components may rupture and could potentially cause personal injury.

CAUTION: This system contains MOS devices. Electro-Static Discharge (ESD) precautions should be employed to prevent accidental damage.

1.1 Health & Safety

Exposure to Non-Ionizing (RF) Radiation/Safe Working Distances

The safe working distance from a transmitting antenna may be calculated from the relationship:

$$D = \sqrt{\frac{P_T . G_R}{4\pi . w}}$$

In which D = safe working distance (meters)
PT = transmitter or combiner power output (watts)
GR = antenna gain ratio = anti log (gain dBi ÷10)
w = power density (watts/square meter)

The RF power density value is determined by reference to safety guidelines for exposure of the human body to non-ionizing radiation. It is important to note that the guidelines adopted differ throughout the world and are from time-to-time re-issued with revised guidelines. For RF Central use, a maximum power density limit of 1w/m² is to be applied when calculating minimum safe working distances.

Important Note: It must be remembered that any transmitting equipment radiating power at frequencies of 100 kHz and higher, has the potential to produce thermal and athermal effects upon the human body.

To be safe:

a) Operators should not stand or walk in front of any antenna, nor should they allow anyone else to do so.

b) Operators should not operate any RF transmitter or power amplifier with any of its covers removed, nor should they allow anyone else to do so.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End users must follow the specific operating instructions for satisfying RF exposure compliance.

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This device has been designed to operate with the antennas listed below, and having a maximum gain of 8 dB. Antennas not included in this list, or having a gain greater than 8 dB are STRICTLY PROHIBITED for use with this device. The required antenna impedance is 50 ohms.

1.2 Maximum RF Power Density Limits

The RF Radiation Power Density limit figure recommended by RF Central is based upon guideline levels published in:

a. IEEE standard C95.1 1999 - IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

b. Guidelines for Limiting Exposure to Time-varying Electric, Magnetic & Electromagnetic Fields (up to 300 GHz) published in 1998 by the Secretariat of the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Both documents define guideline RF power density limits for "Controlled" and "Uncontrolled" environments. An uncontrolled environment is defined as one in which the person subjected to the RF radiation may be unaware of and has no control over the radiation energy received. The uncontrolled environment conditions can arise, even in the best-regulated operations and for this reason the limits defined for the uncontrolled environment have been assumed for the RF Central recommended limit.

Documents a) and b) also show the RF power density guidelines to be frequency dependent. Different power density / frequency characteristics are presented in the two documents. To avoid complexity and to avoid areas of uncertainty, RF Central recommends the use of a single power density limit across the frequency range 100 kHz to 300 GHz. The 1w/m² power density limit we recommend satisfies the most stringent of the guidelines published to date.

Footnote: The IICNIRP document may be freely downloaded from the internet at www.icnirp.de/documents/emfgdl.pdf (PDF file).

Issue Status

Issue	Date	Changes
Revision 1.0	January 2008	First Issue
Revision 1.1	February 2008	Updated FCC Exposure Limits
Revision 1.2	March 2008	Updated FCC Exposure Limits

2 INTRODUCTION

Welcome to the world of digital microwave technology with the RFX-NLL-II. This guide will help you make the most of this revolutionary technology that is so simple to set-up and operate you will wonder how you ever did without it.

The RFX-NLL-II wireless technology provides a fully digital microwave link from any camera clearly without ghosting, break-up, or interference at a fraction of the cost of COFDM systems.

This groundbreaking technology has been specifically designed for the needs of ENG, OB, portable field monitoring or video-assist applications.

Unlike analog technology, the RFX-NLL-II allows multiple channels to operate legally in license exempt bands.

Stable MPEG2 video and two channels of audio can be transmitted from a roaming camera for live to air transmission, viewed on a traditional monitor or downloaded to a laptop for immediate reference.

The RFX-NLL-II is engineered for single or multi-camera platforms with composite video, and can be specifically tailored for each and every production.

3 APPLICATIONS

Now everyone can be part of the digital revolution. Whether you are filming a feature film, documentary, or live sporting event, the RFX-NLL-II delivers reliability every time, at a fraction of the cost you'd expect.

• ENG live-to-air roaming camera link

• Multi-camera production

• Digital replacement for analog video assist

• Reality TV and portable field monitoring

• Sporting arena and events filming

• Monitor and record fixed point or body worn surveillance cameras

• Instantly record and review stored footage using HDD recorders.

4 FEATURES OF THE RFX-NLL-II

• Simple to set-up and operate

Simply plug in video, audio and power cables.

• License exempt

• No break-up, noise or interference

The RFX-NLL-II far exceeds any analog microwave system with superior video and audio quality, and a revolutionary diversity antenna receiving system that reduces interference and break-up even further.

• Diversity antenna receiving system

The RFX-NLL-II integrates a revolutionary diversity antenna system that minimizes multi-path and dramatically increases picture stability.

• Secure transmission with point-to-point encryption

Traditional analog UHF and 2.4 GHz transmission can be easily tapped into and recorded by unauthorized persons, risking piracy. The RFX-NLL-II provides secure transmission at all times with pre-shared key encryption.

• Auto channel select

Unit auto selects the clearest of multiple channels within the frequency band.

• MPEG-2 compression

The RFX-NLL-II uses MPEG-2 technology to ensure full SD quality, with resolution at full frame rate (480 lines interlaced)

• Two channels of analog audio

The RFX-NLL-II has 2 channels of CD quality audio that can be used for stereo audio feeds live to air, camera feeds or a combination of audio and time code.

• Operates without interference to or from Wi-Fi a, b, or g, cordless or mobile telephones and household appliances

The RFX-NLL-II automatically scans the entire license exempt frequency band and selects a clear channel each time you set-up.

5 BEFORE USING THE RFX-NLL-II

Before using the RFX-NLL-II for the first time, please check the following to ensure the unit hasn't been damaged during shipping.

1. Visually inspect outer casing, plugs, and cables to ensure there are no breakages.

2. Slowly rotate the RFX-NLL-II 360 degrees to ensure all components are in place and nothing is loose inside the casing.

If you require assistance or are concerned about the working condition of the RFX-NLL-II, please contact our RF ExtremeCare Technical Support team by telephoning **866.732.0113**.

6 SAFETY INSTRUCTIONS

Follow these safety precautions when using the RFX-NLL-II to reduce the risk of damage and malfunction of the system, other property, and persons.

• Keep all ventilation holes clear and unblocked. Ensure that proper ventilation is provided at all times when in use.

• Do not insert objects of any kind into the ventilation holes as this may result in damage to the RFX-NLL-II.

• Use only the antennas provided with this system (RFC Part #: **RFX-AN0202F**). **Use of any other antennas with this system is STRICTLY PROHIBITED.**

• Do not use when wet and provide adequate cover when using in the rain.

• Do not use liquid cleaners or aerosol cleaners on the RFX-NLL-II. Use a damp cloth for cleaning.

• Do not disassemble this product. If service or repair is required, contact our RF ExtremeCare Technical Support team by telephoning **866.732.0113.**

7 USING THE RFX-NLL-II

The RFX-NLL-II has been designed to be as compact and light as possible for the operator to use. The casing of the RFX-NLL-II is durable and constructed to last, but care should be taken to avoid damaging the sensitive circuit board inside. Do not attempt to open or service the RFX-NLL-II. The internal circuit and antennas are highly tuned and tampering with them will damage the unit.

Correct choice for antennas and placement is the key to a reliable system. Keeping 'line of sight' as much as possible between the cameraman and the receiver will also increase your range and reliability.

The RFX-NLL-II's unique transmission system is specifically designed to transmit broadcast quality video through walls and floors from a moving camera. However, all microwave transmission systems will have their range dramatically reduced when attempting to transmit through objects such as concrete, steel, glass, water and the human body.

Remember the main rule of thumb is if the 'GREEN LED' (link quality indicator) is flashing slowly, don't go live.

8 SETUP

8.1 RECEIVER:

Mount the receiver on a stand or in a position where the best 'line of sight' to the camera will be achieved. Walls and floors will dramatically reduce the range.

Keep the antennas as high as possible to stop crowds and audiences blocking the signal.

Supply the receiver with 8-18v DC from a battery or power supply via the 4 pin XLR.